This document is based on European standards and is not valid for use in U.S.A.

Compact / CANopen / HMI Controller / XBT GC/GT/GK
System User Guide

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Schneider Electric

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Important Information

NOTICE Read these instructions carefully, and look at the equipment to become familiar with the device before trying to install, operate, or maintain it. The following special messages may appear throughout this documentation or on the equipment to warn of potential hazards or to call attention to information that clarifies or simplifies a procedure.

	The addition of this symbol to a Danger or Warning safety label indicates that an electrical hazard exists, which will result in personal injury if the instructions are not followed.

	This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER

DANGER indicates an imminently hazardous situation, which, if not avoided, **will result in** death or serious injury.

⚠ WARNING

WARNING indicates a potentially hazardous situation, which, if not avoided, **can result in** death, serious injury, or equipment damage.

⚠ CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result in** injury or equipment damage.

CAUTION

CAUTION indicates a potentially hazardous situation, which, if not avoided, **can result in** injury or equipment damage.

PLEASE NOTE Electrical equipment should be installed, operated, serviced, and maintained only by qualified personnel. No responsibility is assumed by Schneider Electric for any consequences arising out of the use of this material.

A qualified person is one who has skills and knowledge related to the construction and operation of electrical equipment and the installation, and has received safety training to recognize and avoid the hazards involved

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Before You Begin

Do not use this product on machinery lacking effective point-of-operation guarding. Lack of effective point-of-operation guarding on a machine can result in serious injury to **the operator of that machine.**

⚠ WARNING
UNGUARDED MACHINERY CAN CAUSE SERIOUS INJURY • Do not use this software and related automation products on equipment which does not have point-of-operation protection. • Do not reach into machine during operation. **Failure to follow these instructions can cause death, serious injury or equipment damage.**

This automation equipment and related software is used to control a variety of industrial processes. The type or model of automation equipment suitable for each application will vary depending on factors such as the control function required, degree of protection required, production methods, unusual conditions, government regulations, etc. In some applications, more than one processor may be required, as when backup redundancy is needed.

Only the user can be aware of all the conditions and factors present during setup, operation and maintenance of the machine; therefore, only the user can determine the automation equipment and the related safeties and interlocks which can be properly used. When selecting automation and control equipment and related software for a particular application, the user should refer to the applicable local and national standards and regulations. A "National Safety Council's" Accident Prevention Manual also provides much useful information.

In some applications, such as packaging machinery, additional operator protection such as point-of-operation guarding must be provided. This is necessary if the operator's hands and other parts of the body are free to enter the pinch points or other hazardous areas and serious injury can occur. Software products by itself cannot protect an operator from injury. For this reason the software cannot be substituted for or take the place of point-of-operation protection.

Ensure that appropriate safeties and mechanical/electrical interlocks for point-of-operation protection have been installed and are operational before placing the equipment into service. All mechanical/electrical interlocks and safeties for point-of-operation protection must be coordinated with the related automation equipment and software programming.

NOTE: Coordination of safeties and mechanical/electrical interlocks for point-of-operation protection is outside the scope of this document.

START UP AND TEST

Before using electrical control and automation equipment for regular operation after installation, the system should be given a start up test by qualified personnel to verify correct operation of the equipment. It is important that arrangements for such a check be made and that enough time is allowed to perform complete and satisfactory testing.

⚠ CAUTION

EQUIPMENT OPERATION HAZARD

- Verify that all installation and set up procedures have been completed.
- Before operational tests are performed, remove all blocks or other temporary holding means used for shipment from all component devices.
- Remove tools, meters and debris from equipment.

Failure to follow these instructions can result in injury or equipment damage.

Follow all start up tests recommended in the equipment documentation. Store all equipment documentation for future reference.

Software testing must be done in both simulated and real environments.

Verify that the completed system is free from all short circuits and grounds, except those grounds installed according to local regulations (according to the National Electrical Code in the U.S.A, for instance). If high-potential voltage testing is necessary, follow recommendations in equipment documentation to prevent accidental equipment damage.

Before energizing equipment:

- Remove tools, meters, and debris from equipment.
- Close the equipment enclosure door.
- Remove ground from incoming power lines.
- Perform all start-up tests recommended by the manufacturer.

OPERATION AND ADJUSTMENTS

The following precautions are from NEMA Standards Publication ICS 7.1-1995 (English version prevails):

- Regardless of the care exercised in the design and manufacture of equipment or in the selection and rating of components, there are hazards that can be encountered if such equipment is improperly operated.

It is sometimes possible to misadjust the equipment and thus produce unsatisfactory or unsafe operation. Always use the manufacturer's instructions as a guide for functional adjustments. Personnel who have access to these adjustments should be familiar with the equipment manufacturer's instructions and the machinery used with the electrical equipment.

- Only those operational adjustments actually required by the operator should be accessible to the operator. Access to other controls should be restricted to prevent unauthorized changes in operating characteristics.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

- Only use software tools approved by Schneider Electric for use with this equipment.
- Update your application program every time you change the physical hardware configuration.

Failure to follow these instructions can cause death, serious injury or equipment damage.

Introduction

Introduction

This document is intended to provide a quick introduction to the described system. It is not intended to replace any specific product documentation, nor any of your own design documentation. On the contrary, it offers additional information to the product documentation, for installing, configuring and implementing the system.

The architecture described in this document is not a specific product in the normal commercial sense. It describes an example of how Schneider Electric and third-party components may be integrated to fulfill an industrial application.

A detailed functional description or the specification for a specific user application is not part of this document. Nevertheless, the document outlines some typical applications where the system might be implemented.

The architecture described in this document has been fully tested in our laboratories using all the specific references you will find in the component list near the end of this document. Of course, your specific application requirements may be different and will require additional and/or different components. In this case, you will have to adapt the information provided in this document to your particular needs. To do so, you will need to consult the specific product documentation of the components that you are substituting in this architecture. Pay particular attention in conforming to any safety information, different electrical requirements and normative standards that would apply to your adaptation.

It should be noted that there are some major components in the architecture described in this document that cannot be substituted without completely invalidating the architecture, descriptions, instructions, wiring diagrams and compatibility between the various software and hardware components specified herein. You must be aware of the consequences of component substitution in the architecture described in this document as substitutions may impair the compatibility and interoperability of software and hardware.

⚠ CAUTION

EQUIPMENT INCOMPATIBILITY OR INOPERABLE EQUIPMENT

Read and thoroughly understand all hardware and software documentation before attempting any component substitutions.

Failure to follow these instructions can result in injury or equipment damage.

Abbreviations

Abbreviation	Signification
AC	Alternating Current
CB	Circuit Breaker
CFC	Continuous Function Chart - a programming language based on function chart
DI	Digital Input
DO	Digital Output
DC	Direct Current
DFB	Derived Function Blocks
EDS	Electronic Data Sheet
E-STOP	Emergency Stop
FBD	Function Block Diagram - an IEC-61131 programming language
HMI	Human Machine Interface
I/O	Input/Output
IL	Instruction List - a textual IEC-61131 programming language
IP	Internet Protocol
LD	Ladder Diagram - a graphic IEC-61131 programming language
MBTCP	Communications protocol with Modbus over TCP (Ethernet)
MFB	PLCopen Motion Function Block
PC	Personal Computer
POU	Programmable Object Unit, Program Section in SoMachine
PDO	Process Data Object (CANopen)
PS	Power Supply
RMS	Root Mean Square
RPM	Revolution Per Minutes
RTU	Remote Terminal Unit
RPDO	Receive Process Data Object (CANopen)
SD	Stepper motor Drive
SE	Schneider Electric
SFC	Sequential Function Chart - an IEC-61131 programming language
SDO	Service Data Object
ST	Structured Text - an IEC-61131 programming language
TPDO	Transmit Process Data Object (CANopen)
TVDA	Tested, Validated and Documented Architecture
UDP	User Data Protocol
VSD	Variable Speed Drive
WxHxD	Dimensions: Width, Height and Depth

Glossary

Expression	Signification
Advantys	SE product name for a family of I/O modules
Advantys Configuration Software	SE software product to parameterize the Advantys I/O modules
Altivar (ATV)	SE product name for a family of VSDs
CANopen	Name for a communications machine bus system
Harmony	SE product name for a family of switches and indicators
Lexium (LXM)	SE product name for a family of servo drives
Magelis	SE product name for a family of HMI devices
Magelis XBTGC HMI controller	SE product name for a HMI controller
Phaseo	SE product name for a family of power supplies
PLCopen	An international standard for industrial controller programming.
Preventa	SE product name for a family of safety devices
SoMachine	SE product name for an integrated software tool
TeSys	SE product name for a family of motor protection devices and load contactors
Vijeo Designer	SE product name for Magelis HMI devices configuration software

Application Source Code

Introduction

The example source code is in the form of configuration, application and import files. Use the appropriate software tool to either open or import the files.

Extension	File Type	Software Tool Required
CSV	Comma Separated Values, Spreadsheet	MS Excel
DCF	Device Configuration File	Advantys Configuration Software
DOC	Document file	Microsoft Word
DWG	Project file	AutoCAD
EDS	Electronic Data Sheet - Device Definition	Industrial standard
PDF	Portable Document Format - document	Adobe Acrobat
PROJECT	Project file	SoMachine
VDZ	Project file	Vijeo Designer
ZW1	Project archive file	EPLAN P8

Typical Applications

Introduction

Here you will find a list of the typical applications, and their market segments, where this system or subsystem can be applied:

Packaging

- Filling & closing machines
- Boxing machines
- Carton closing / erecting machines
- Shrink wrapping machines

Textile

- Opening and closing machines
- Circular knitting machines
- Plucking machines
- Blending machines
- Carding machines
- Drawing frame machines
- Combing machines
- Ring Spinning machines

Pumping

- Booster stations
- Compressors
- Vacuum pumps

HVAC-R

- Compressors

Other Machines

- Wood working machines
- Cutting machines
- Sanders machines
- Sawing machines

SPECIAL NOTE
The products specified in this document have been tested under actual service conditions. Of course, your specific application requirements may be different from those assumed for this and any related examples described herein. In that case, you will have to adapt the information provided in this and other related documents to your particular needs. To do so, you will need to consult the specific product documentation of the hardware and/or software components that you may add or substitute for any examples specified in this documentation. Pay particular attention and conform to any safety information, different electrical requirements and normative standards that would apply to your adaptation.

The application examples and descriptions contained in this document have been developed based on products and standards available and defined for Europe. Some or all of the application examples may contain recommendations of products that are not available in your country or locality, or may recommend wiring, products, procedures or functions that are in conflict with your local, regional or national electrical or safety codes and/or normative standards**.**

⚠ WARNING

REGULATORY INCOMPATIBILITY

Be sure that all equipment applied and systems designed comply with all applicable local, regional and national regulations and standards.

Failure to follow these instructions can result in death, serious injury, or equipment damage.

NOTE:
The information in this document is based on European standards and may not be valid for use in the U.S.A.

The use and application of the information contained herein require expertise in the design and programming of automated control systems. Only the user or integrator can be aware of all the conditions and factors present during installation and setup, operation, and maintenance of the machine or process, and can therefore determine the automation and associated equipment and the related safety provisions and interlocks which can be effectively and properly used. When selecting automation and control equipment, and any other related equipment or software, for a particular application, the user or integrator must also consider any applicable local, regional or national standards and/or regulations.

System

Introduction

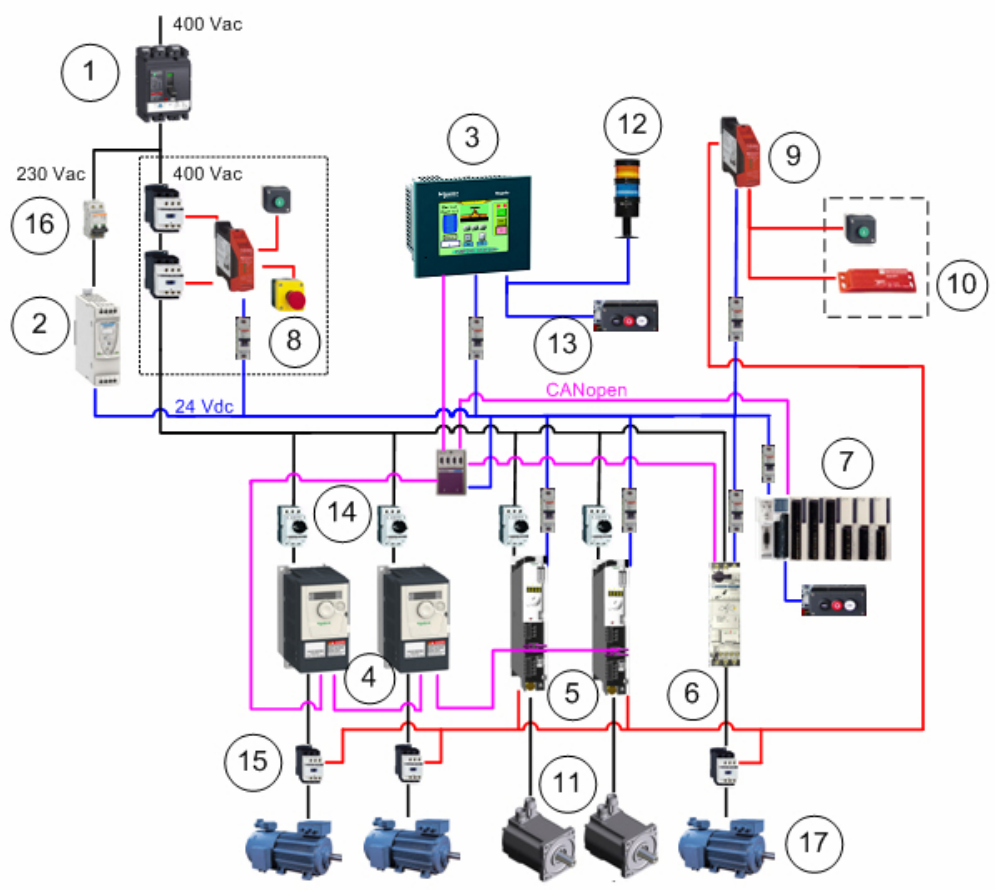
The system chapter describes the architecture, the dimensions, the quantities and different types of components used within this system.

Architecture

General

The controller in this application is a Magelis XBTGC2230T HMI controller. The user can control and monitor the application using the XBTGC. The VSDs, the servo drives, the motor starter and the I/O Island are connected to the controller via a CANopen bus.
The example application includes two functional safety options according to EN ISO 13849-1 standards: an Emergency Stop function supervised by a Preventa Safety Module (see the appropriate hardware manual), plus a second Preventa Safety Module to evaluate protective door sensors.

Layout



1. Compact NSX main switch
2. Phaseo ABL8 power supply
3. Magelis XBTGC HMI controller
4. Altivar 312 variable speed drive
5. Lexium 32 servo drive
6. TeSysU motor starter
7. Advantys OTB I/O - island
8. Harmony Emergency Stop enclosure XALK
9. Preventa safety module XPS
10. Preventa safety switch XCS
11. Lexium servo motor BMH
12. Harmony tower light XVBC
13. Harmony pushbuttons enclosure XALD
14. TeSys motor circuit breaker GV2L
15. TeSysD load contactor LC1D
16. Multi 9 circuit breaker
17. AC-motor

Components

Hardware:

- Main switch type Compact NSX100F
- Circuit breaker GV2L (Short Circuit protected) for the motor drives
- Emergency Stop switch with rotation release (trigger action)
- Phaseo ABL8 power supply
- Magelis XBTGC HMI controller
- Altivar 312 variable speed drive
- Lexium 32A servo drive
- TeSysU motor starter
- Advantys OTB I/O island
- Harmony pushbuttons
- Preventa XPS safety module
- TeSysD load contactors
- Multi 9 circuit breaker

Software:

- SoMachine V3.0
- Advantys Configuration Software V5.0

Quantities of Components

For a complete and detailed list of components, the quantities required and the order number, please refer to the components list at the rear of this document.

Degree of Protection

Not all the components in this configuration are designed to withstand the same environmental conditions. Some components may need additional protection, in the form of housings, depending on the environment in which you intend to use them. For environmental details of the individual components please refer to the list in the appendix of this document and the corresponding user manual.

Cabinet Technical Data

Input	Mains voltage	400 Vac
	Power requirement	~ 3 kW
	Cable Size	5 x 2.5 mm² (L1, L2, L3, N, PE)
	Cable Connection	3 phase + Neutral + Ground Neutral is needed for 230 Vac (Phase and Neutral)
Output	Motor power ratings	2 asynchronous motors 0.37 kW controlled by ATV312 (0.37 kW) 2 servo motors (BMH type without brake) controlled by LXM32A (continuous output current 6 A RMS at 6000 RPM) 1 asynchronous motors controlled by TeSysU (0.37 kW)

Functional Safety Notice

(EN ISO 13849-1 EN IEC 62061)

The standard and level of functional safety you apply to your application is determined by your system design and the overall extent to which your system may be a hazard to people and machinery.

Whether or not a specific functional safety category should be applied to your system should be ascertained with a proper risk analysis.

This document is not comprehensive for any systems using the given architecture and does not absolve users of their duty to uphold the functional safety requirements with respect to the equipment used in their systems or of compliance with either national or international safety laws and regulations

Emergency Stop Emergency Stop / Emergency Disconnection function

This function for stopping in an emergency is a protective measure which compliments the safety functions for the safeguarding of hazardous zones according to prEN ISO 12100-2.

Safety Functions Door guarding:

up to Performance Level (PL) = b, Safety Integrity Level (SIL) = 1

Dimensions The dimensions of the individual devices used; controller, drive, power supply, etc. require a housing cabinet size of at least 800 x 1400 x 400 mm (WxHxD).

The HMI display, illuminated indicators such as “SYSTEM ON“, “SYSTEM OFF“ or “ACKNOWLEDGE EMERGENCY STOP“ as well as the Emergency Stop switch itself, can be built into the door of the cabinet.

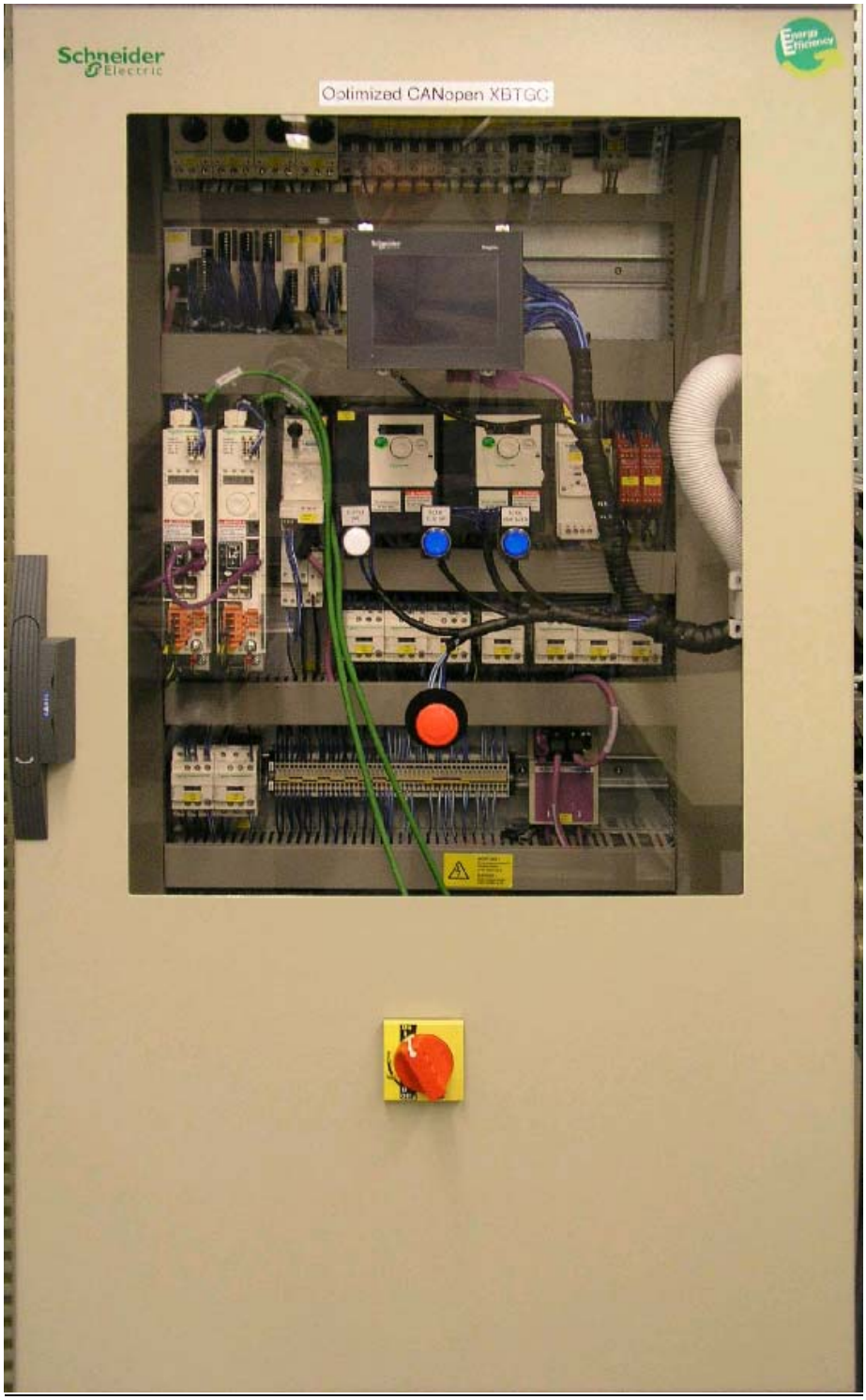
Installation

Introduction

This chapter describes the steps necessary to set up the hardware and configure the software required to fulfill the described function of the application.

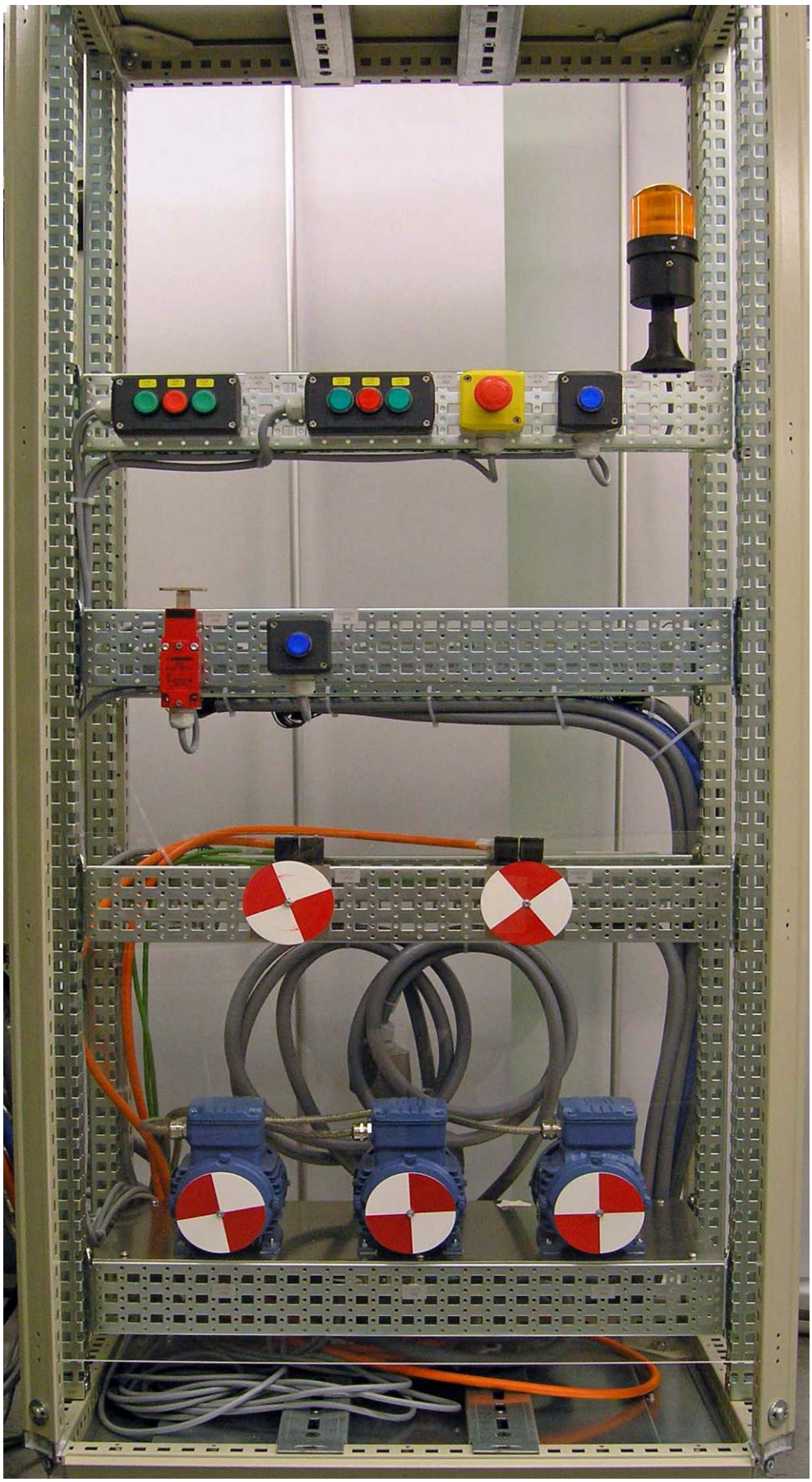
Assembly

Front view



Interior view

Field devices and motors of main rack



Notes

The components designed for installation in a cabinet, i.e. the safety modules, circuit breakers, contactors, motor circuit breakers, power supply, TeSysU motor starters and the OTB I/O island can be mounted on a 35 mm DIN rail.

The Magelis XBTGC HMI controller is mounted in the panel door.

Main switch, Lexium 32A servo drives and Altivar 312 variable speed drives are screwed directly onto the mounting plate. Alternatively the Altivar 312 can be mounted on a DIN rail if an adapter is used.

The Emergency Stop button, door safety switches and the pushbutton housing for the display and acknowledgement indicators are designed for on-wall mounting in the field. All switches (except the door guard switch) can also be installed directly in a control cabinet (e.g., in a cabinet door) without special housings.

There are two options for installing XB5 pushbuttons or indicator lamps. These pushbuttons or switches can be installed either in a 22 mm hole, e.g., drilled into the front door of the control cabinet, or in an XALD type housing suitable for up to 5 pushbuttons or indicator lamps. The XALD pushbutton housing is designed for backplane assembly or direct wall mounting.

The individual components must be interconnected in accordance with the detailed circuit diagram in order to ensure that they function correctly.

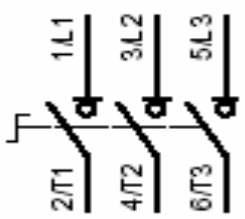
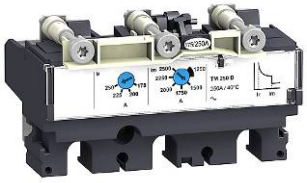
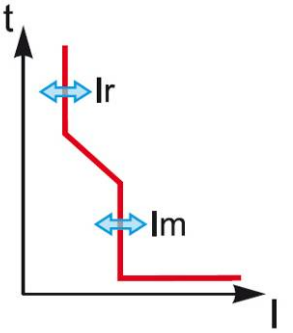
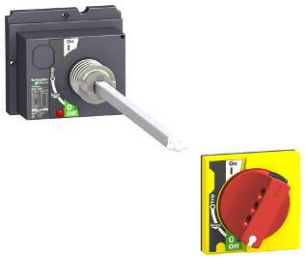
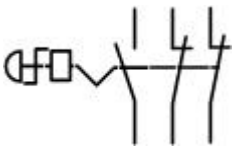
- 400 Vac 3-phase or 230 Vac 1-phase wiring for the motion and drive circuitry (Lexium 32A, Altivar 312, TeSysU).
- 230 Vac wiring for the power supply.
- 24 Vdc wiring for control circuits, HMI Controller, I/O island, motor starter, power supply and functional safety.

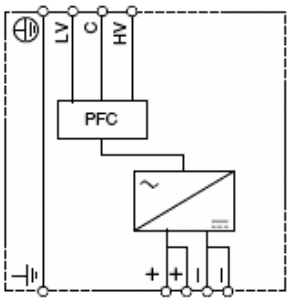
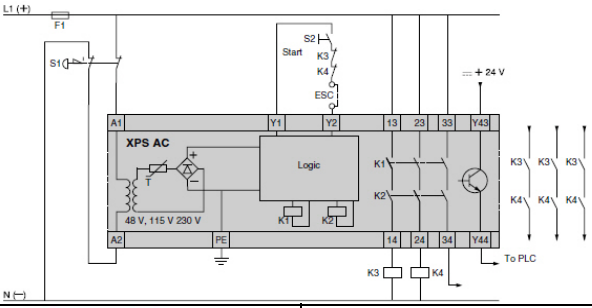
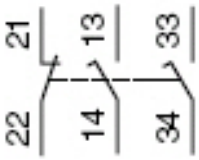
CANopen cables are installed for the communication link between the XBTGC, the Altivar 312, the Lexium 32A, the TeSysU and the Advantys OTB I/O island.

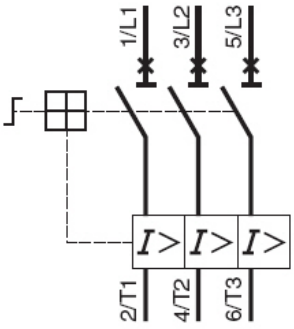
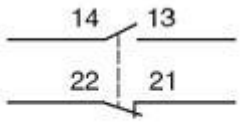
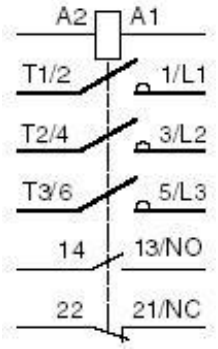
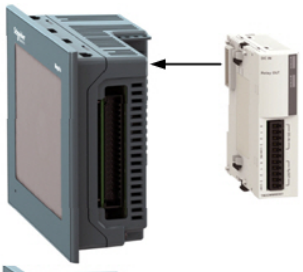
Hardware

General

General description of the hardware.

Main Switch **Compact NSX100F** **LV429003** 36 kA 380 / 415 Vac		
Main Switch **Compact NSX100F** **LV429035** Trip unit TM32D Thermal-magnetic 32 A		 Ir - Thermal protection Im - Magnetic protection
Main Switch **Compact NSX100F** Rotary handle **LV429340** Terminal shield LV429515	 Rotary handle with red handle on yellow front	 Terminal shield short
Emergency Stop switch **Harmony** (trigger action) **XALK178G**		

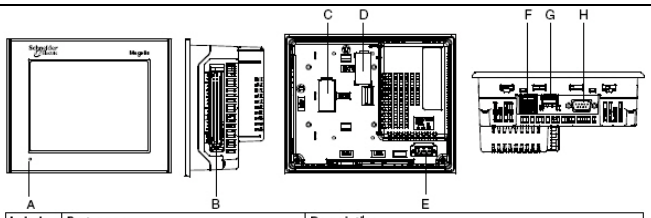
Power supply **Phaseo** **ABL8RPS24030** 230 Vac 24 Vdc, 3 A		
Safety Module **Preventa** **XPSAC5121**	 	
Door Guard switch **XCSA502** **with actuator XCSZ02**	 	

Motor Circuit Breaker **GV2L07** and **GV2L10** with auxiliary contact **GVAE11**		  **GVAE11**
Contactor **TeSysD** **LC1D18BD**		
Magelis HMI controller **XBTGC2230T** **+** **XBTZGCCAN** **CANopen Master**	 	

Magelis HMI controller

XBTGC2230T

Description

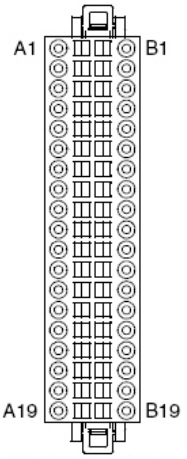


Label	Part name	Description
A	Status LED	Indicates the XBT GC's status, e.g. power input, firmware RUN status or backlight condition. Also, indicates the status of logic program execution. See table below.
B	DIO Interface (DIO)	Interface to mount external I/O equipment using the DIO connector.
C	AUX Unit Interface / Expansion Unit (EXT2)	Interface where additional units such as communication devices can be connected.
D	Expansion Module Interface (EXT1)	Interface to mount the Expansion Module.
E	Power Plug Connector	Used to connect external 24 VDC power supply to terminal.
F	Ethernet Interface (10BASE-T/100BASE-TX) Not available with XBT GC2120• units	Ethernet transmission interface (10BASE-T/100BASE-TX). An RJ-45 type modular jack connector (8-pole) is used. The LED turns on or off to indicate the current status. See table below.
G	USB Host Interface (USB)	Conforms to USB1.1. (TYPE-A conn.) Power Supply Voltage: 5 VDC 5% Output Current: 500 mA (at maximum) Connects a data transfer cable or USB-compatible printer. The maximum communication distance is 5 m *(16.4 ft)*.
H	Serial Interface (COM1)	RS232C/RS422/RS485 serial interface. SUB-D 9-pin plug type connector. Communication method is switched via software.

Magelis HMI controller

XBTGC2230T

DIO Interface
(Connector)

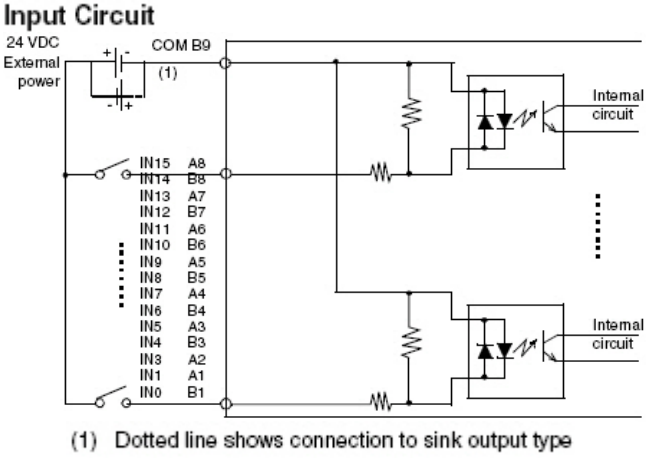
Pin Arrangement	Pin N°	Signal Name	Pin N°	Signal Name
	A1	IN1	B1	IN0 (CT0)
	A2	IN3	B2	IN2 (CT1)
	A3	IN5	B3	IN4 (CT2)
	A4	IN7	B4	IN6 (CT3)
	A5	IN9	B5	IN8
	A6	IN11	B6	IN10
	A7	IN13	B7	IN12
	A8	IN15	B8	IN14
	A9	NC	B9	COM
	A10	Sink: NC Source: +24V	B10	Sink: +24V Source: +24V
	A11	Sink: 0V Source: NC	B11	Sink: 0V Source: 0V
	A12	OUT1 (PLS1, PWM1	B12	OUT0 (PLS0, PWM0
	A13	OUT3 (PLS3, PWM3	B13	OUT2 (PLS2, PWM2
	A14	OUT5	B14	OUT4
	A15	OUT7	B15	OUT6
	A16	OUT9	B16	OUT8
	A17	OUT11	B17	OUT10
	A18	OUT13	B18	OUT12
	A19	OUT15	B19	OUT14

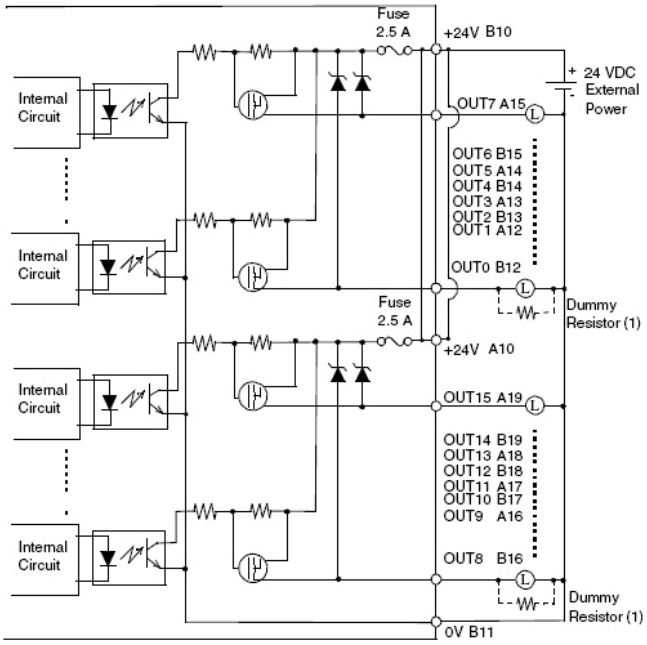
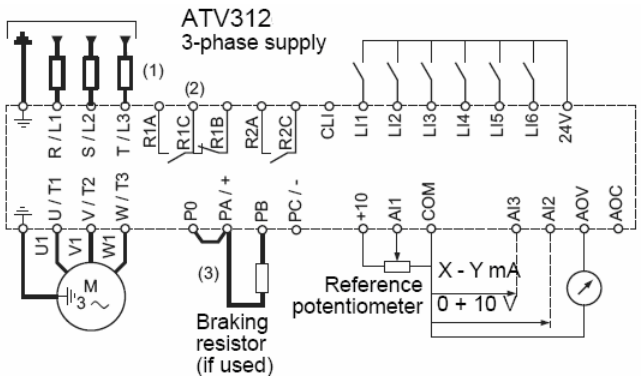
(Cable connection side)

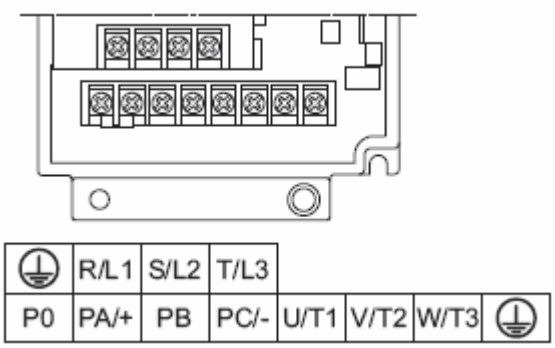
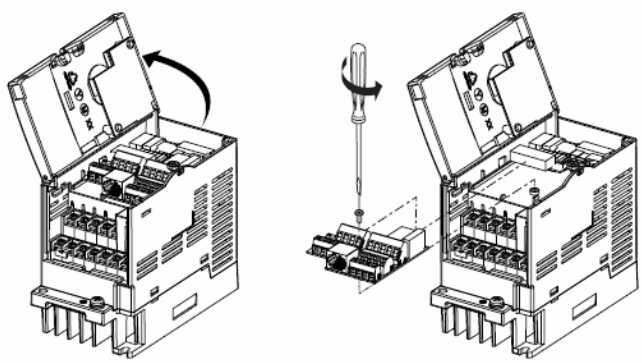
Magelis HMI controller

XBTGC2230T

DIO Interface
(Connector)



Magelis HMI controller **XBTGC2230T** DIO Interface (Connector)	XBT GC2••0T Output Circuit (Source type) :  (1) (Example) The output delay time (OFF to ON) is 1.5 µs where the output current is 24 VDC, 50 mA. Install an external dummy resistor to increase the amount of current when more responsiveness is required and the load is light.
Variable Speed Drive **Altivar 312** **ATV312H037N4** 3-phase 400 Vac, 0.37 kW	 

Variable Speed Drive **Altivar 312** **ATV312H037N4** 3-phase 400 Vac, 0.37 kW	**Power terminals** 
Variable Speed Drive **Altivar 312** **ATV312H037N4** 3-phase 400 Vac, 0.37 kW	**Control terminals** 

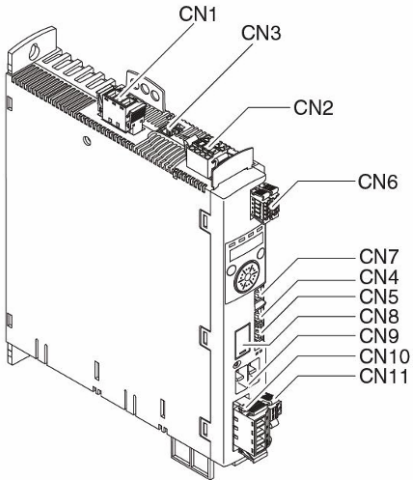
Servo Drive

Lexium 32A

LXM32AD18M2

1-phase

230 Vac, continuous output current:
6 A RMS at 6000 RPM



Connection	Assignment
CN1	Power stage supply voltage
CN2	24 controller supply voltage and STO safety function
CN3	Motor encoder (encoder 1)
CN4	PTO (encoder simulation ESIM)
CN5	PTI (pulse/direction, A/B, CW/CCW)
CN6	Analog inputs and digital inputs/outputs
CN7	Modbus (commissioning interface)
CN8	External braking resistor
CN9	DC bus connection for parallel operation
CN10	Motor phases
CN11	Holding brake

Servo Drive

Lexium 32A

LXM32AD18M2

Embedded Human Machine Interface

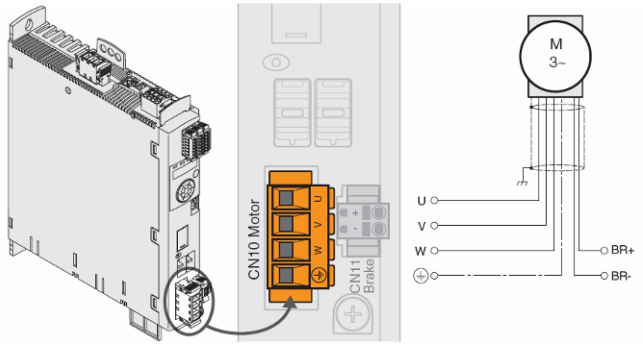
Servo Drive

Lexium 32A

1-phase

LXM32AD18M2

Wiring diagram
Power cable connection to motor (Length 3 m)



Connection	Meaning	Color
U	Motor phase	Black L1 (BK)
V	Motor phase	Black L2 (BK)
W	Motor phase	Black L3 (BK)
PE	Protective ground conductor	Green/yellow (GN/YE)
BR+	Holding brake +	White (WH)
BR-	Holding brake -	Gray (GR)

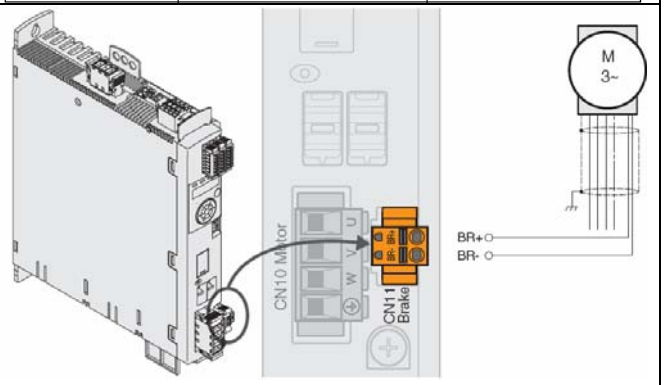
Servo Drive

Lexium 32A

1-phase

LXM32AD18M2

Wiring diagram holding brake



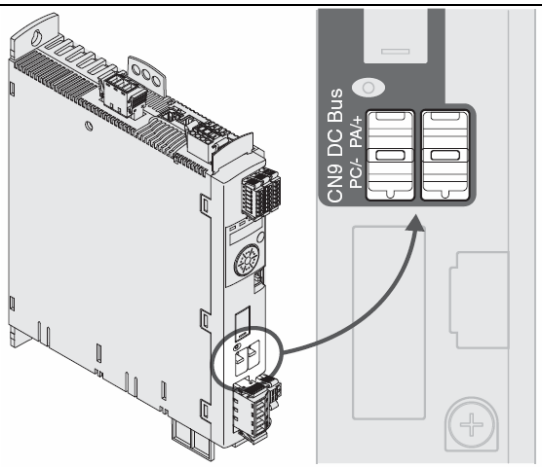
Servo Drive

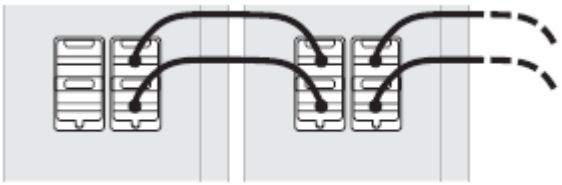
Lexium 32A

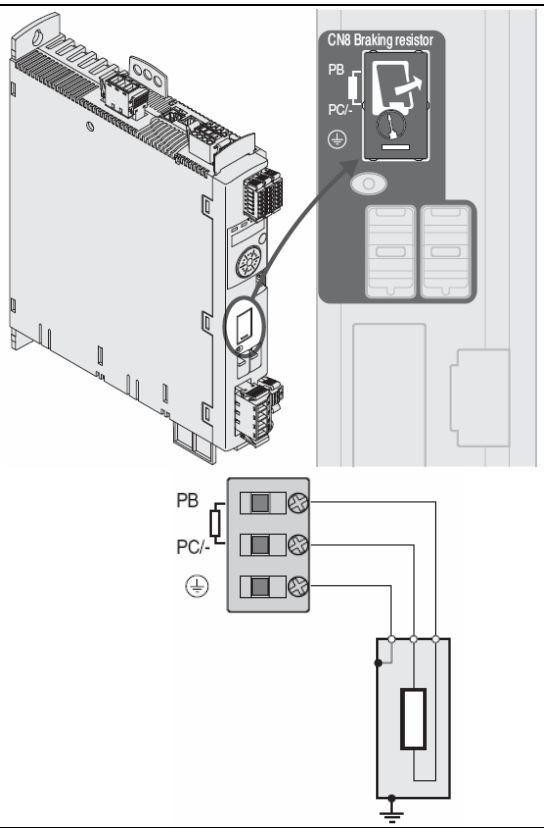
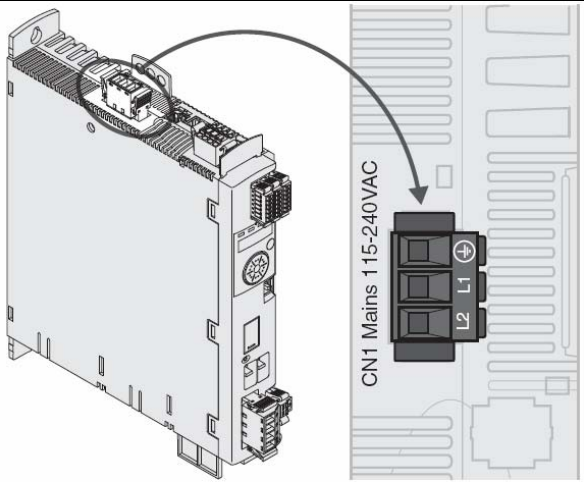
1-phase

LXM32AD18M2

Parallel connection DC bus





Servo Drive **Lexium 32A** 1-phase **LXM32AD18M2** Connecting the external braking resistor	
Servo Drive **Lexium 32A** 1-phase **LXM32AD18M2** Wiring diagram power stage supply voltage for 1-phase device	

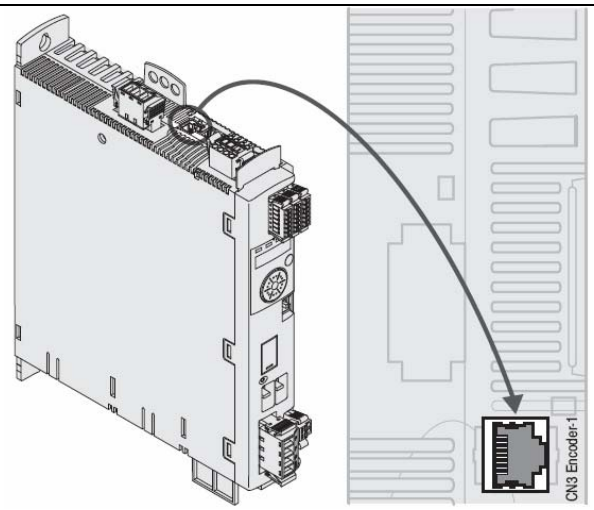
Servo Drive

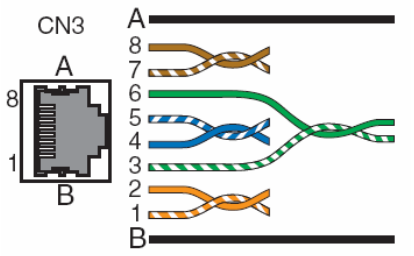
Lexium 32A

1-phase

LXM32AD18M2

Wiring diagram motor encoder





Pin	Signal	Motor, pin	Pair	Meaning	I/O
1	COS+	9	2	Cosine signal	I
2	REFCOS	5	2	Reference for cosine signal	I
3	SIN+	8	3	Sine signal	I
6	REFSIN	4	3	Reference for sine signal	I
4	Data	6	1	Receive data, transmit data	I/O
5	$\overline{\text{Data}}$	7	1	Receive data and transmit data, inverted	I/O
7	reserved		4	Not assigned	
8	reserved		4	Not assigned	
A	ENC+10V_OUT	10	5	Encoder supply	O
B	ENC_0V	11	5	Reference potential for encoder supply	
	SHLD			Shield	

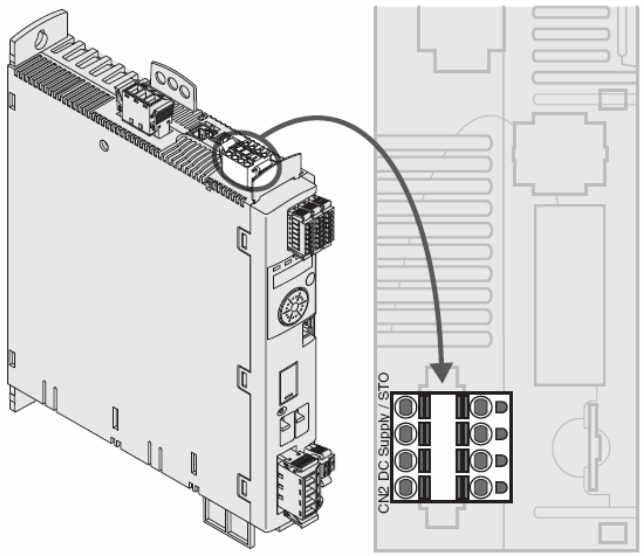
Servo Drive

Lexium 32A

1-phase

LXM32AD18M2

Wiring diagram controller supply voltage



Pin	Signal	Meaning
1, 5	$\overline{\text{STO_A}}$	Safety function STO: Dual-channel connection, connection A
2, 6	$\overline{\text{STO_B}}$	Safety function STO: Dual-channel connection, connection B
3, 7	+24VDC	24 V controller supply voltage
4, 8	0VDC	Reference potential for 24V controller supply voltage; Reference potential for STO

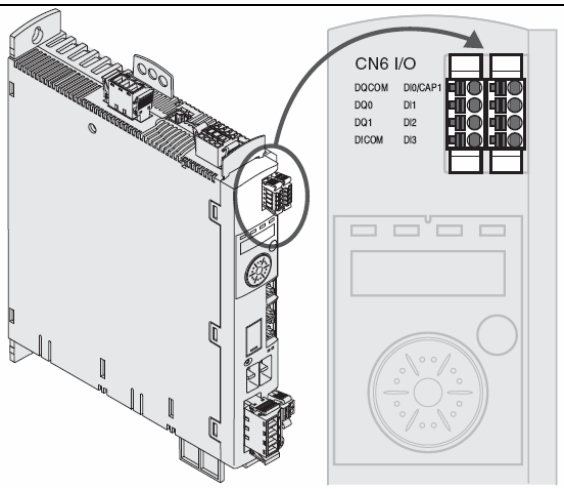
Servo Drive

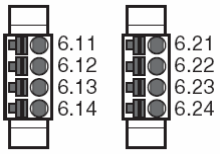
Lexium 32A

1-phase

LXM32AD18M2

Wiring diagram, digital inputs/outputs





Pin	Signal	1)	Meaning	I/O
CN6.11	DQ_COM		Reference potential digital outputs	
CN6.12	DQ0	X	Digital output 0	O (24 V)
CN6.13	DQ1	X	Digital output 1	O (24 V)
CN6.14	DI_COM		Reference potential digital inputs	

1) Connector coding, X=coding

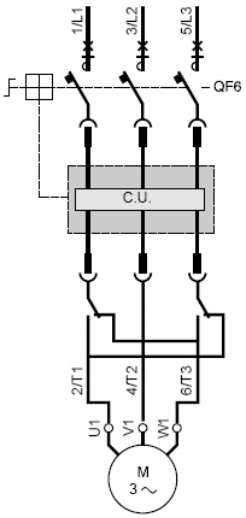
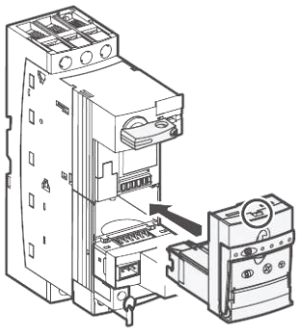
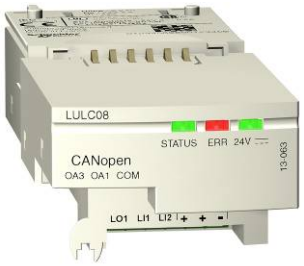
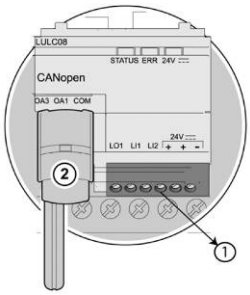
Pin	Signal	1)	Meaning	I/O
CN6.21	DI0 / CAP1	X	Digital input 0 / touch probe 0	I (24 V)
CN6.22	DI1		Digital input 1	I (24 V)
CN6.23	DI2		Digital input 2	I (24 V)
CN6.24	DI3	X	Digital input 3	I (24 V)
	DI_COM		Reference potential digital inputs: CN6.14	

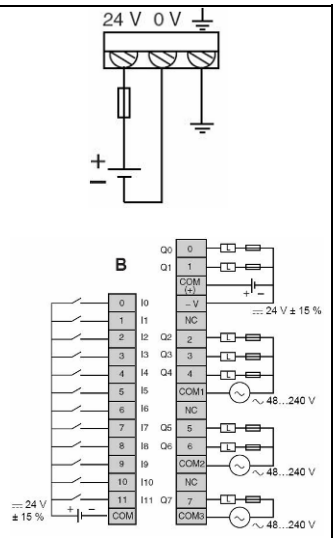
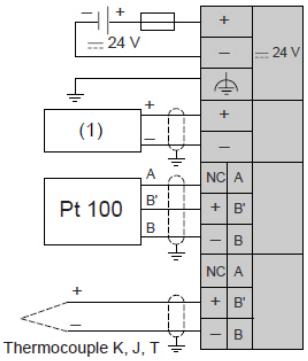
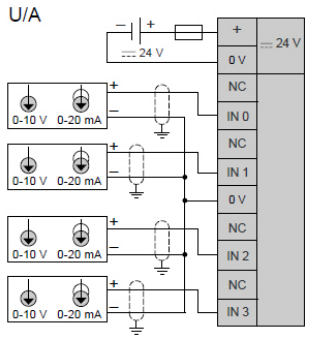
1) Connector coding, X=coding

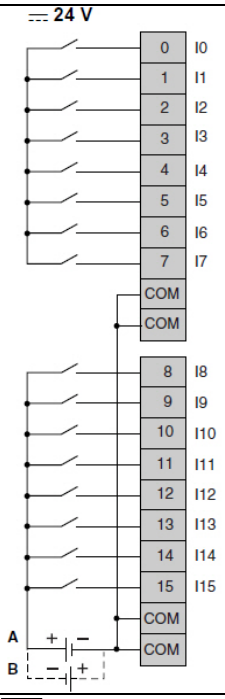
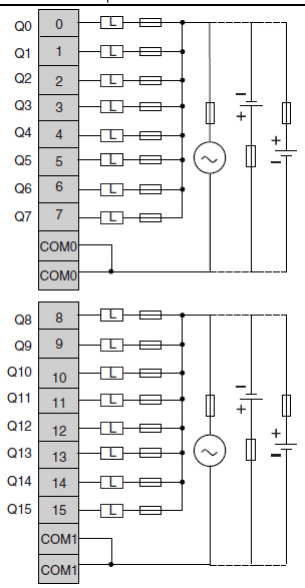
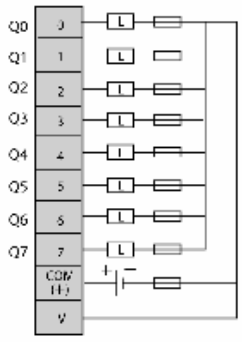
Servo Motor

BMH0702P02A2A

without brake

Motor Starter **TeSysU** Power base **LUB12BL** two directions Coil wiring kit **LU9MRL**		
Motor Starter **TeSysU** Control Unit **LUCA05BL**		
Motor Starter **TeSysU** CANopen communication module **LULC08**		 1. 24 Vdc power Supply 2. Terminal for coil wiring kit
Motor Starter **TeSysU** Coil Unit **LU9MRL**		

Advantys OTB CANopen network interface module **OTB1C0DM9LP** 12 Digital Inputs 8 Digital Outputs		
Advantys OTB expansion I/O modules **TM2ALM3LT** 2 Pt100 / Thermocouple Inputs and 1 Analog Output		 (1) Voltage/current pre-actuator.
Advantys OTB expansion I/O modules **TM2AMI4LT** 4 Analog Inputs		

Advantys OTB expansion I/O modules **TM2DDI16DT** 16 Digital Inputs		
Advantys OTB expansion I/O modules **TM2DRA16RT** 16 Digital Relay Outputs		
Advantys OTB expansion I/O modules **TM2DO08TT** 8 Digital Outputs		

Software

General

The main programming work is the programming of the Magelis XBTGC HMI controller, the configuration of the CANopen bus and creating the screens for the HMI display.

Programming the Magelis XBTGC HMI controller is done by using SoMachine.

Programming of the HMI part is done by using Vijeo Designer which is integrated into SoMachine.

The configuration of the Advantys OTB Island is done using the Advantys Configuration Software.

The basic configuration of the drives (ATV312 and LXM32A) is done using the control panel.

To use the software packages, your PC must have the appropriate Microsoft Windows operating system installed:

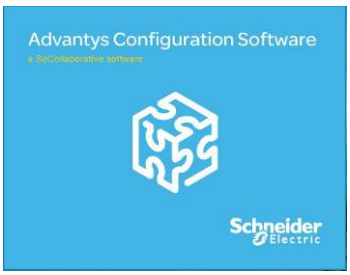
- Windows XP Professional

The software tools have the following default install paths:

- SoMachine
  C:\Program Files\Schneider Electric\SoMachine

- Vijeo Designer (Installed with SoMachine)
  C:\Program Files\Schneider Electric\Vijeo Designer

- Advantys Configuration Software
  C:\Program Files\Schneider Electric\Advantys



Communication

General

The TVDA architecture includes a communication fieldbus. The CANopen fieldbus connects the Magelis XBTGC HMI controller as CANopen Master and Altivar drives, Advantys OTB I/O-Island, TeSysU and Lexium 32A servo drives as CANopen nodes.

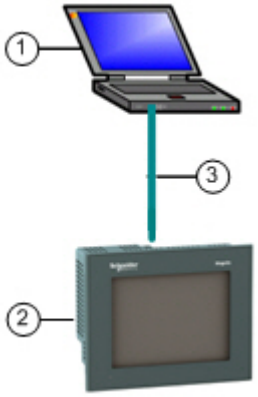
All the servo drives, variable speed drives, motor starter and I/O islands are connected to the CANopen fieldbus via a CANopen TAP. The CANopen transmission rate is 500 kbps.

The Magelis XBTGC HMI controller is a combination of HMI controller and HMI display. The download from the PC to the HMI controller and to the HMI display is done using a single connection.

The front panel on the devices themselves are used to configure the ATV312 and the LXM32A.

Note

The two Altivar drives ATV312 are connected in line to the CANopen network using the CANopen option card supporting a "daisy chain" topology (Port 1 in, Port 2 out). Likewise, the two Lexium servo drives LXM32 are connected to the CANopen network in a "daisy chain" topology such that the first drive Port 2 is connected to the second drive Port 1.

PC ↔ XBTGC The download direction is from the PC to the Magelis XBTGC using the transfer cable **XBTZG935**.	 **1. PC** **2. HMI XBTGC** **3. USB to USB cable XBTZG935**
PC ↔ HMI PC connection cable **XBTZG935** Cable for the connection between a SoMachine equipped PC and XBTGC	

Altivar 312

CANopen

daisy chain option

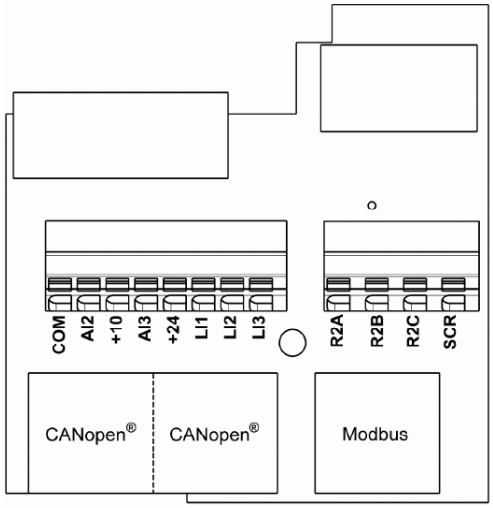
Node ID: 1 and 2

ATV312

CANopen option card

daisy chain option

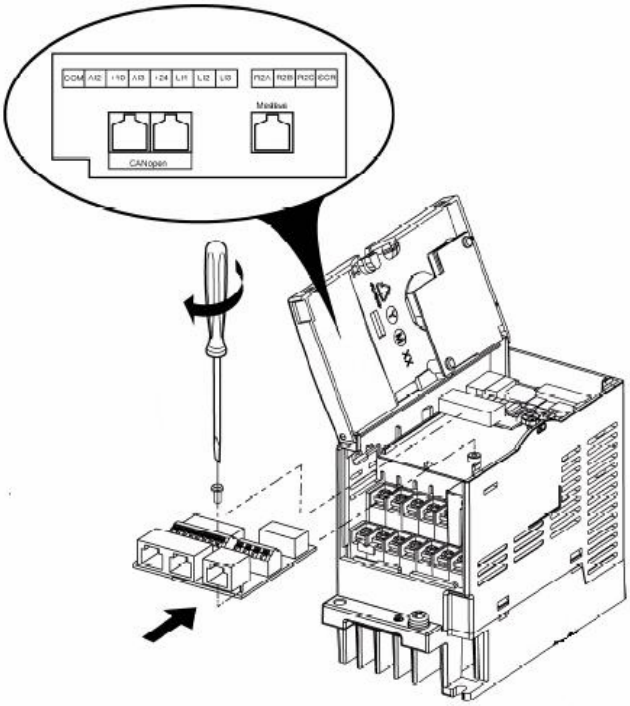
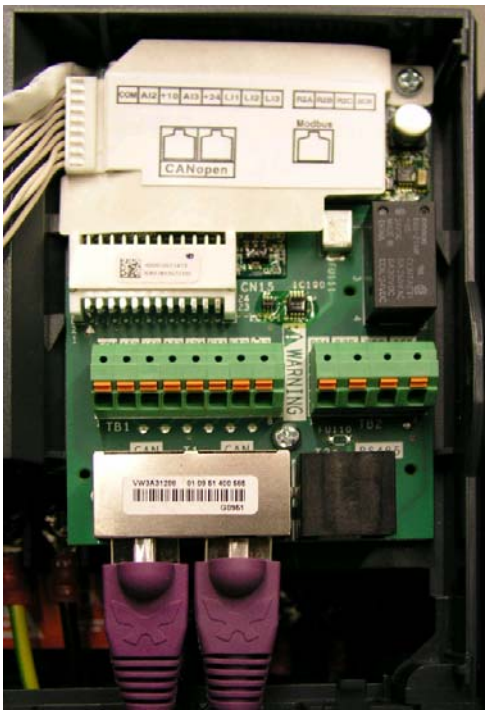
VW3A31208

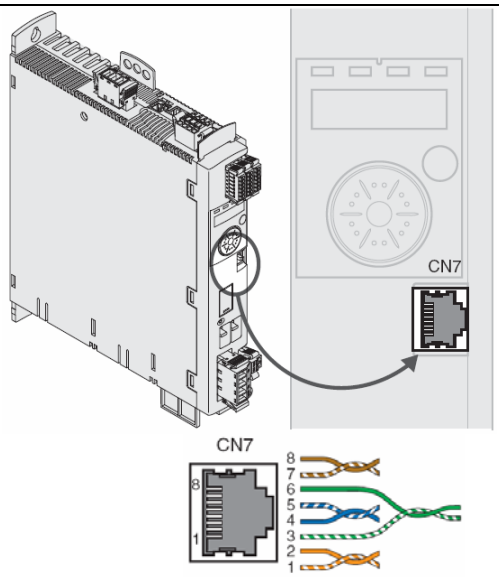
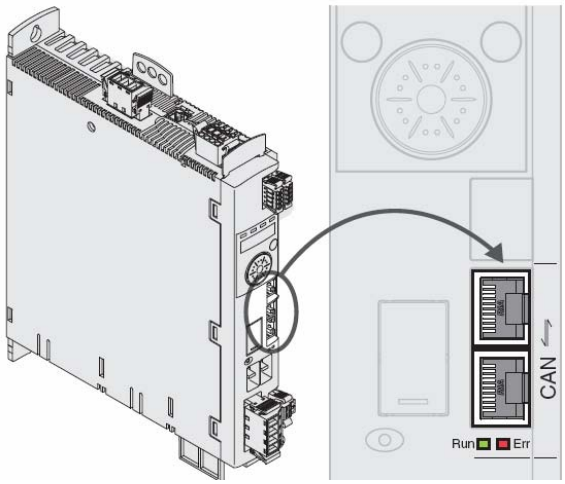
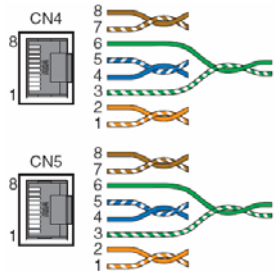


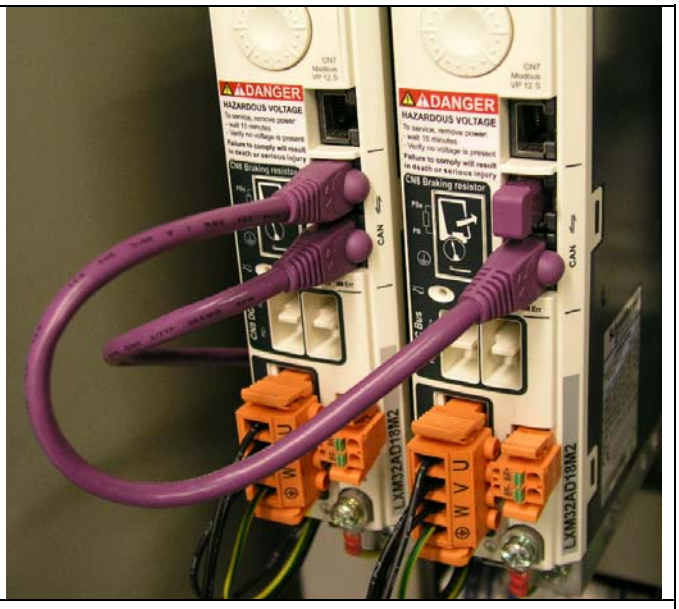
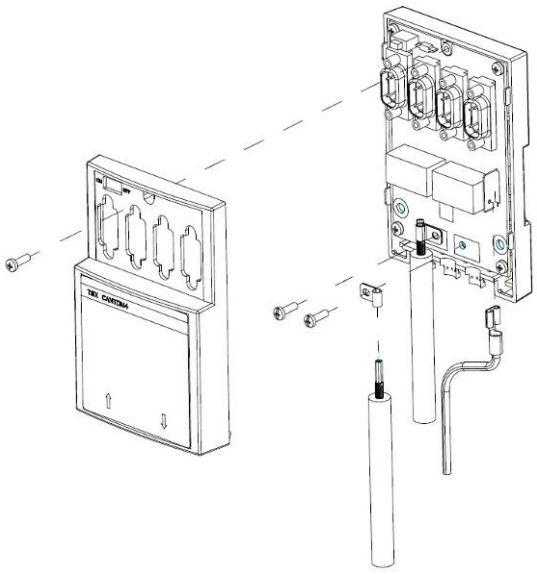
Control terminals characteristics

Control terminals characteristics

Terminal	Function	Electrical characteristics
COM	Analog I/O common	0 V
AI2	Analog voltage input	Analog bipolar voltage input ±10 V: • Impedance 30 kΩ • maximum safe voltage 30 V
10 V	Power supply for the reference potentiometer (2.2 to 10 kΩ)	+10 V (+ 8% - 0): • 10 mA max • protected against short-circuits and overloads
AI3	Analog current input	Analog current input X-Y mA by programming X and Y from 0 to 20 mA: Impedance 250Ω
24 V	Logic input power supply	• + 24 V protected against short-circuits and overloads, min 19 V, max 30 V • Maximum customer current available 100 mA
LI1	Logic inputs	Programmable logic inputs: • Impedance 3.5 kΩ • + 24 V internal or 24 V external power supply (min. 19 V, max. 30 V) • Max. current: 100 mA • Max. sampling time: 4 ms Source position: Positive logic State 0 if < 5 V or logic input not wired, state 1 if > 11 V Sink position: Negative logic State 0 if > 19 V or logic input not wired, state 1 if < 13 V CLI position: Connection to PLC output
LI2		
LI3		
R2A	Configurable relay outputs 1 relay logic output, one "N/C" contact and one "N/O" contact with common point.	• Minimum switching capacity: 10 mA for 5 Vdc • Maximum switching capacity on resistive load (cos φ = 1 and L/R= 0 ms). 5 A for 250 Vac and 30 Vdc • Maximum switching capacity on inductive load (cos φ = 0.4 and L/R = 7 ms): 2 A for 250 Vac and 30 Vdc • Sampling time 8 ms • Service life: 100,000 operations at maximum switching power
R2B		
R2C		
SCR	(Screen)	CANopen® communication shield terminal. This terminal is not connected to other circuits in this board. Ground this terminal in a location separated from the ground of power line.

ATV312 **CANopen option card** daisy chain option **VW3A31208**	
ATV312 **CANopen option card** daisy chain option **VW3A31208**	

Lexium 32A **Modbus connection**	 **Pin Signal Meaning** 1. nc Reserved 2. nc Reserved 3. nc Reserved 4. MOD_D1 Bidirectional transmit/receive signal 5. MOD_D0 Bidirectional transmit/receive signal, inverted 6. nc Reserved 7. MOD+10V_OUT 10 Vdc power supply, max. 150 mA 8. MOD_0V Reference potential to MOD+10V_OUT
Lexium 32A **CANopen connection** **Node ID: 3 and 4**	  **Pin Signal Meaning** 1. CAN_H CAN interface 2. CAN_L CAN interface 3. CAN_0V Reference potential CAN 4. nc not used 5. nc not used 6. nc not used 7. nc not used 8. nc not used

Lexium 32A **CANopen connection** Daisy Chain **Node ID: 3 and 4**	
CANopen **RJ45 Line Resistor** **TCSCAR013M120**	
CANopen TAP **TSXCANTDM4** 4 port CANopen junction box For the purpose of this application, the sliding switch should be set to **OFF** if it is not at the end of the CANopen line.	 

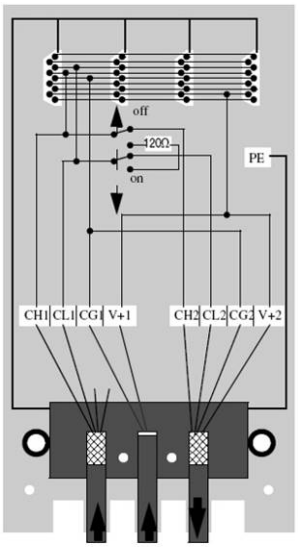
CANopen TAP

TSXCANTDM4

Note: When using devices which require a 24 Vdc power supply on CANopen line (such as TeSysU) the 24 Vdc power must be wired.

Power supply:

V+1 24 Vdc
CG1 0 Vdc



Signal	Terminal block 1	Terminal block 2	Wire color
CAN_H	CH1	CH2	white
CAN_L	CL1	CL2	blue
CAN_GND	CG1	CG2	black
CAN_V+	V+1	V+2	red

CANopen preassembled connection cable

TCSCCN4F3M1T (length: 1.0 m)

Used to connect Altivar 312, Lexium 32 and TSXCANTDM4.

TSXCANCADD1 (length: 1.0 m)

Used to connect TeSysU and TSXCANTDM4.

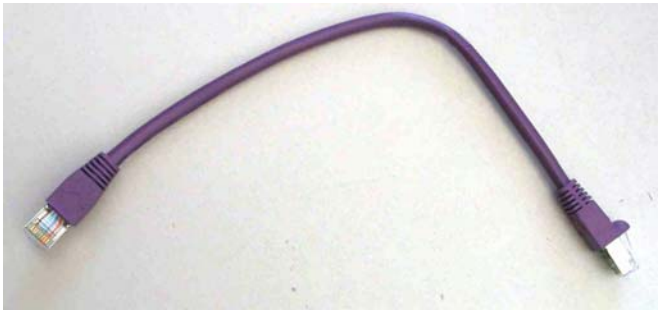
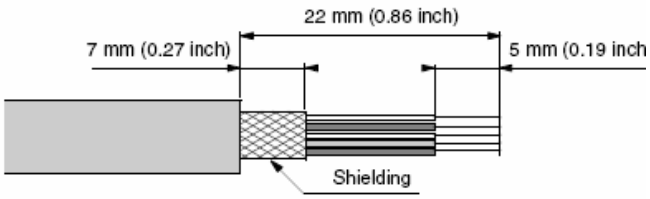
CANopen connector

VW3CANKCDF90T, VW3CANKCDF90TP
or
VW3CANKCDF180T

These connectors are used for the link to the CANopen node.

VW3CANKCDF90T, VW3CANKCDF90TP

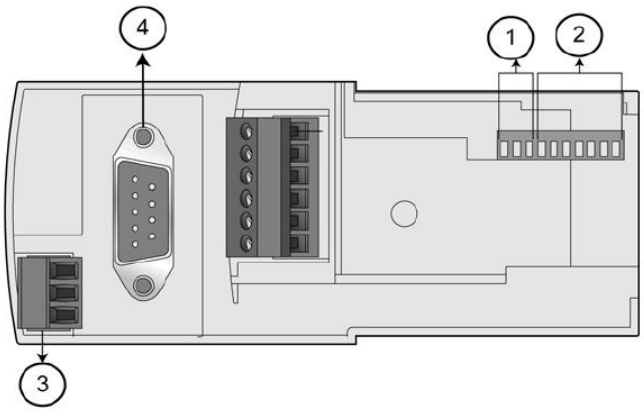
VW3CANKCDF180T

CANopen pre-assembled connection cable **VW3CANCARR03 (length: 0,3m)**	 Used for connecting LXM32 in a daisy chain connection.
CANopen cable **TSXCANCx y** The cable is available in various versions (**x**): A - Standard B - No Flame D - Heavy Duty and various lengths (**y**): 50 - for 50 m 100 - for 100 m, 300 - for 300 m.	 
XBTZGCCAN **CANopen master** **Node ID: 127** **Note:** If the XBTZGCCAN is installed at the beginning of the CANopen bus: install a terminal resistor (120 Ohm) between terminal 2 (CAN_L) and terminal 4 (CAN_H)	

TeSysU CANopen communication module

LULC08

The communication module is connected to the CANopen fieldbus using cable **TSXCANCADD1**



1 Baud rate
2 Address
3 Power base connector
4 CAN bus connector

TeSysU CANopen communication module

LULC08

The baudrate is set to **500 kbps.**

SW10	SW9	SW8	Baud Rate
0	0	0	10 kbps
0	0	1	20 kbps
0	1	0	50 kbps
0	1	1	125 kbps
1	0	0	250 kbps (default)
1	0	1	500 kbps
1	1	0	800 kbps
1	1	1	1,000 kbps

TeSysU CANopen communication module

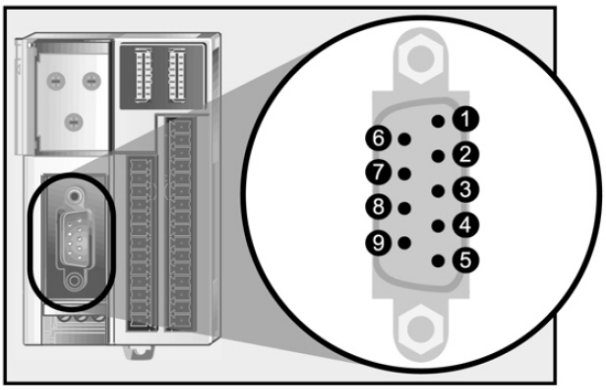
The following address is used: **Node ID: 5**

SW7	SW6	SW5	SW4	SW3	SW2	SW1	Address
0	0	0	0	0	0	0	Not valid
0	0	0	0	0	0	1	1 (default)
0	0	0	0	0	1	0	2
0	0	0	0	0	1	1	3
0	0	0	0	1	0	0	4
0	0	0	0	1	0	1	5

Advantys OTB CANopen network interface module

OTB1C0DM9LP

The communication module is connected to the CANopen fieldbus.

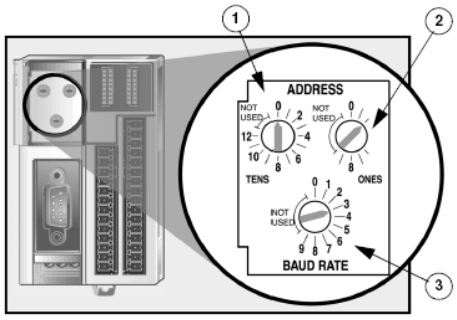


Advantys OTB

OTB1C0DM9LP

Node ID: 10

used baudrate is **500 kbps.**



1. Network address (Node-ID x10) encoder wheel
2. Network address (Node-ID x1) encoder wheel
3. Transmission speed encoder wheel

Position (lower encoder rate)	Baud Rate
0	10 kbits/s
1	20 kbits/s
2	50 kbits/s
3	125 kbits/s
4	250 kbits/s
5	500 kbits/s
6	800 kbits/s
7	1 Mbits/s
8	Automatic
9	Default rate (250 kbits/s)

Implementation

Introduction

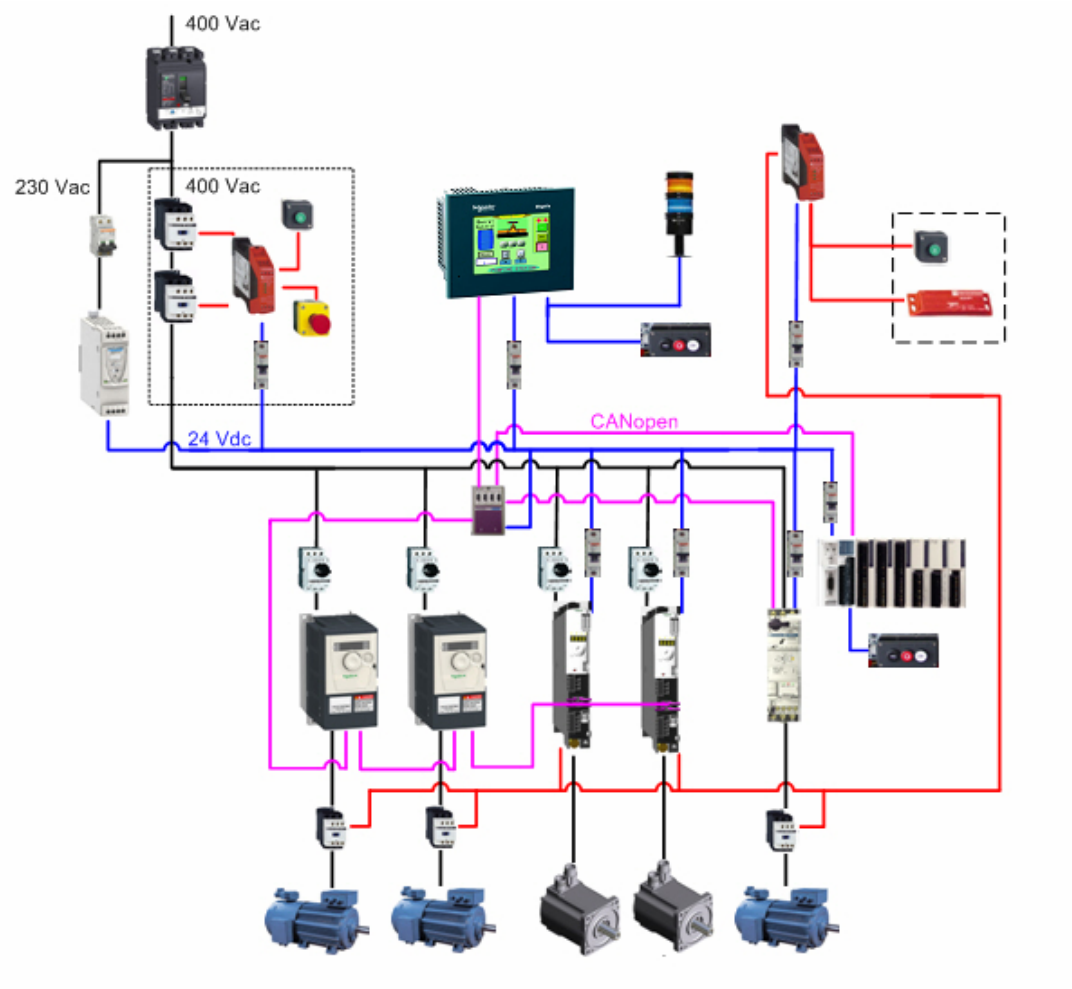
The implementation chapter describes all the steps necessary to initialize, to configure, to program and start-up the system to achieve the application functions as listed below.

Function

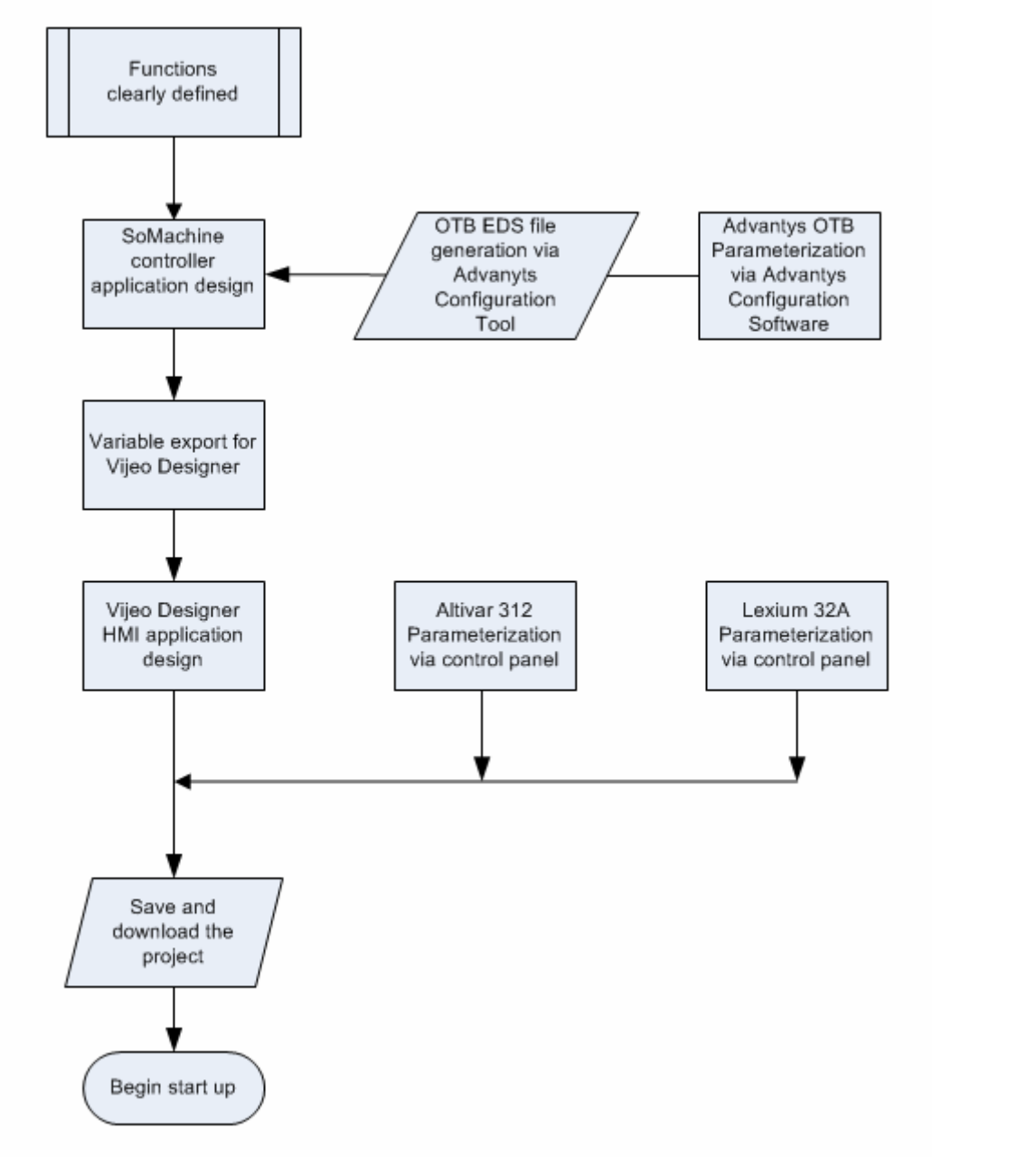
Start up and functional description

1. Ensure all motor circuit breakers and Multi9 circuit breakers are in the ON position.
2. Ensure that the main switch is in the ON position.
3. Press the "ACKN E-STOP" blue illuminated pushbutton on the main cabinet door to acknowledge the system is energized. The blue illuminated pushbutton will turn OFF if the system is energized.
4. Ensure that all machine interlocks are engaged (i.e. the door guard switches)
5. Press the "ACKN DOOR -READY" blue illuminated pushbutton on the main cabinet door to acknowledge the system is ready for operation. The blue illuminated pushbutton will turn OFF if the system is ready for operation.
6. Use Magelis XBTGC HMI controller to control/monitor the system.
    a. The “BUS”, “ALARM”, “SAFETY” screens can be used to monitor the network, system status and alarm messages.
    b. The “ATV312” screen can be used to control/monitor Altivar 312 variable speed drives.
    c. The “LXM32” screen can be used to control/monitor Lexium 32A servo drives.
    d. The “TeSys” screen can be used to control/monitor the TeSysU motor starter.
    e. The “OTB” screen can be used to observe the status of the OTB I/O.
    f. The “System” screen can be used to view the status of the local XBTGC I/O.
    g. Use the “XBTGC” screen to configure the HMI.

Functional Layout



Course of Action



Communication

Introduction

This chapter describes the data passed via the communications networks (e.g. CANopen or Ethernet) that is not bound directly with digital or analog hardware.

The list contains:

- The device links
- Direction of data flow
- Symbolic name
- Bus address of the device concerned.

Device Links

The SoMachine protocol connects:

- The Magelis HMI graphic panel with the HMI controller (internal connection)
- The XBTGC (both HMI & controller) with the programming PC

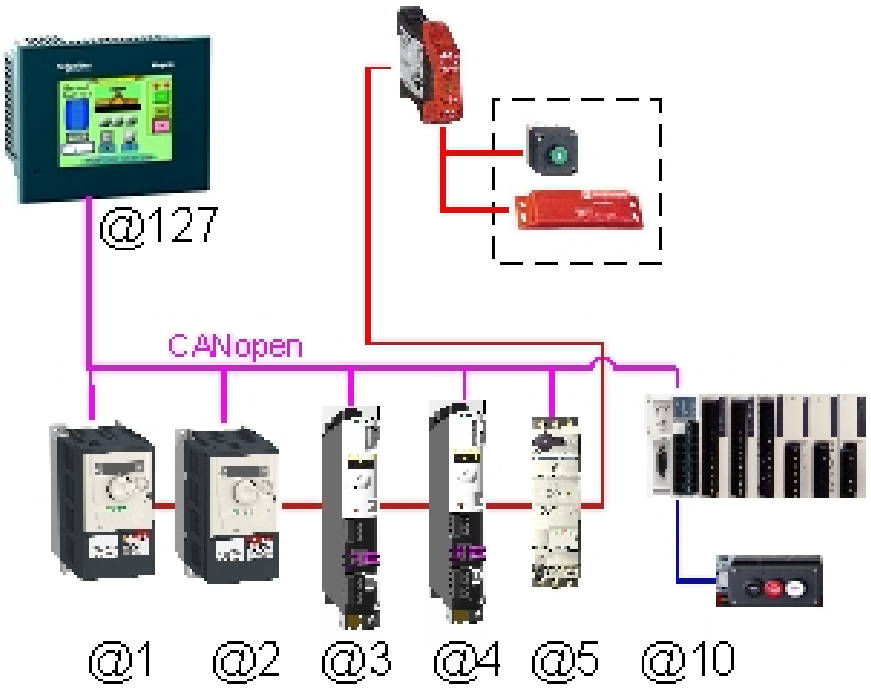
This application uses a CANopen communication fieldbus.

The following devices are connected via CANopen fieldbus:

- 1 x Magelis XBTGC2230T HMI controller + CANopen Master, Node ID: 127
- 2 x Altivar 312 variable speed drives, Node ID: 1 and 2
- 2 x Lexium 32A servo drives, Node ID: 3 and 4
- 1 x TeSysU motor starter, Node ID: 5
- 1 x Advantys OTB I/O island, Node ID: 10

The Baudrate used for CANopen is 500 kbps.

CANopen fieldbus Structure & Addresses



NOTE

For the data exchange between the HMI controller and the Lexium 32A and Altivar 312 PLCopen function blocks are used. It is not necessary to configure the data exchange manually.

Controller

Introduction

The Controller chapter describes the steps required for the initialization and configuration and the source program required to fulfill the functions.

Pre-conditions

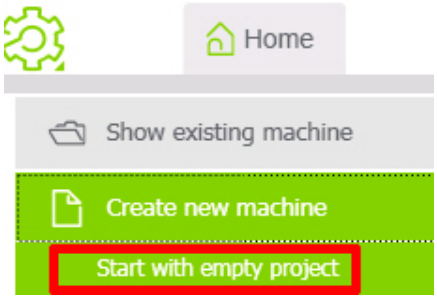
In order to proceed you require the following:

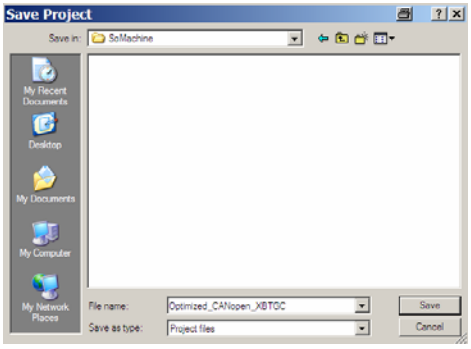
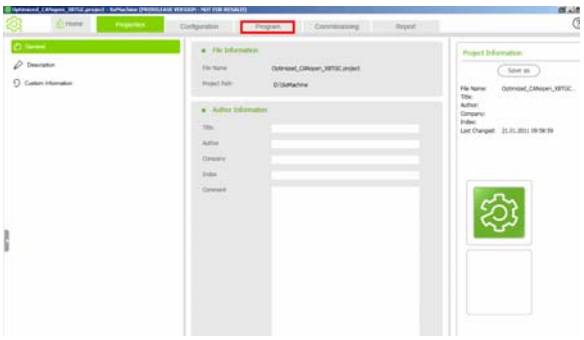
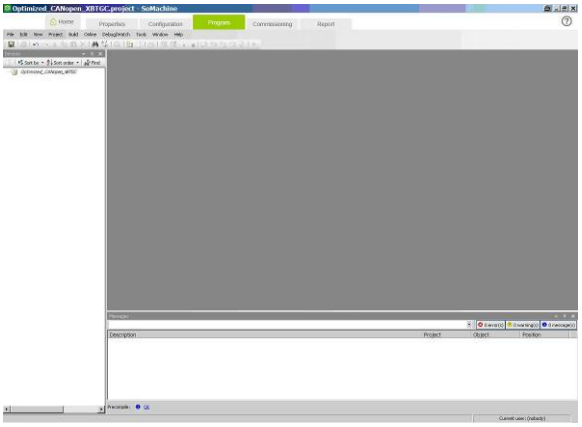
- SoMachine is installed on your PC
- The Magelis XBTGC HMI controller is switched on and running
- The Magelis XBTGC HMI controller is connected to the PC via the XBTZG935 cable

Setting up the HMI controller is done as follows:

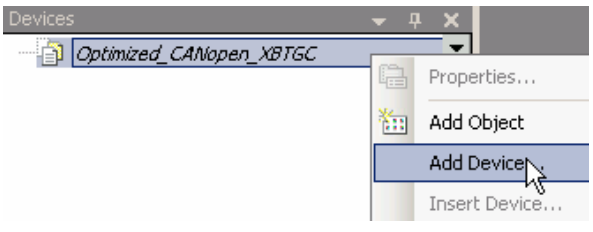
- Create a new project
- Add the XBTGC
- Add the CANopen fieldbus
- Import of the OTB EDS file
- Add CANopen devices
- Altivar 312 CANopen configuration
- Lexium 32A CANopen configuration
- TeSysU CANopen configuration
- OTB CANopen configuration
- Add Toolbox library
- Add Folder
- Add POU
- Task configuration
- Configure controller ↔ HMI data exchange
- Communication setting XBTGC ↔ PC
- Save the project
- Build Application
- Download the Controller and HMI project
- Login to the XBTGC
- Application overview

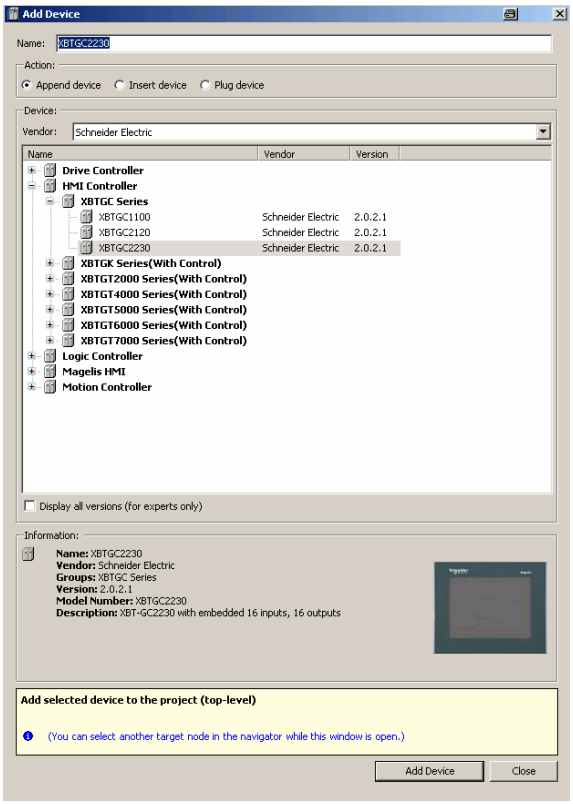
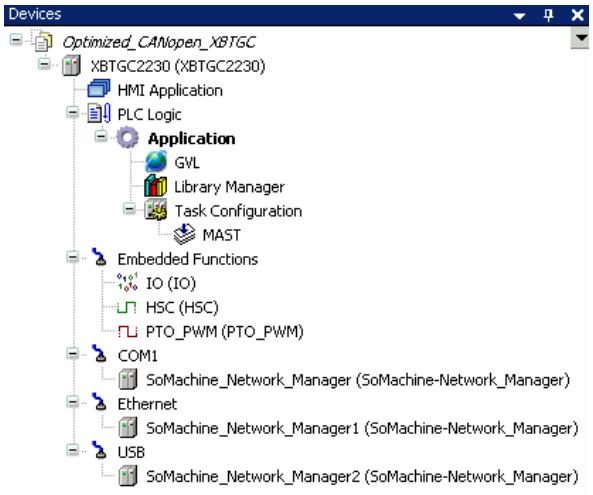
Create a new project

1	To create a new project select **Create new machine→ Start with empty project**	

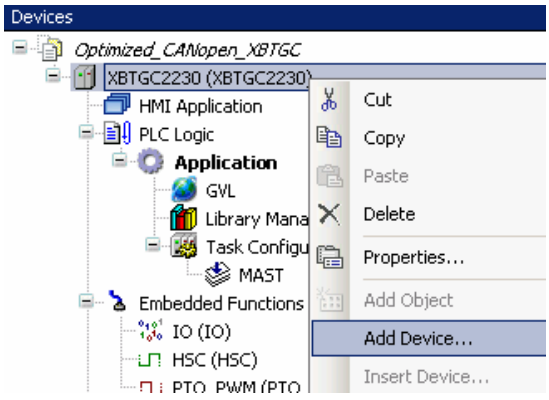
2	In the **Save Project As** dialog enter a **File name** and press **Save.** **Note:** As default the project is saved under My Documents.	
3	The SoMachine User Interface opens. **Note:** Here you can enter your project information.	
4	Select the **Program** tab	
5	The **Program** window appears.	

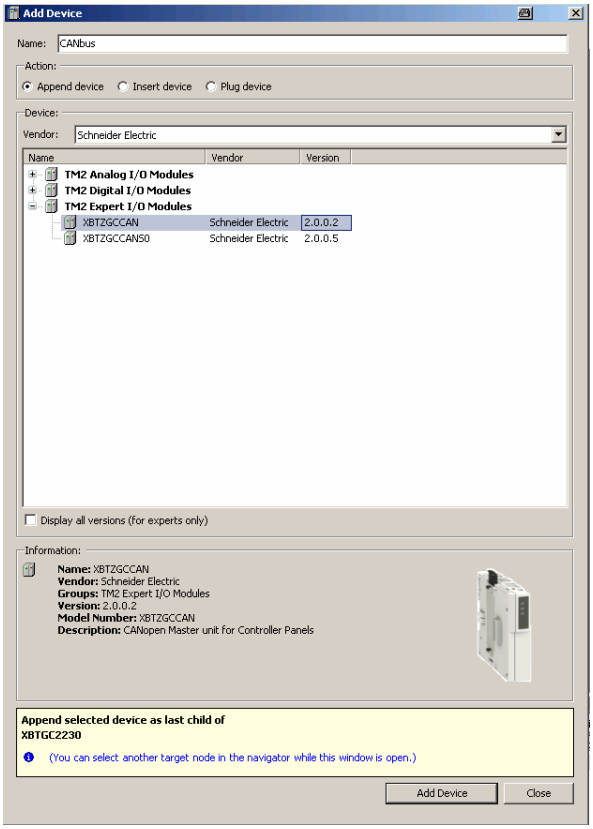
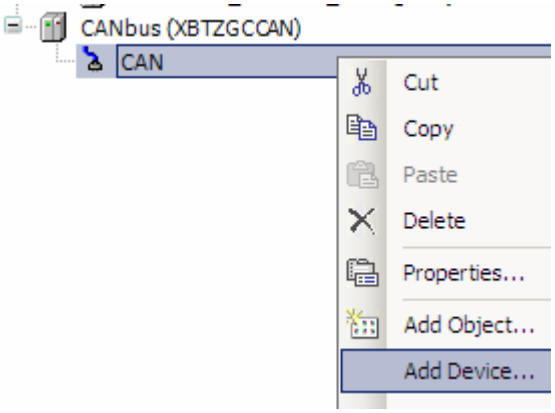
Add the XBTGC

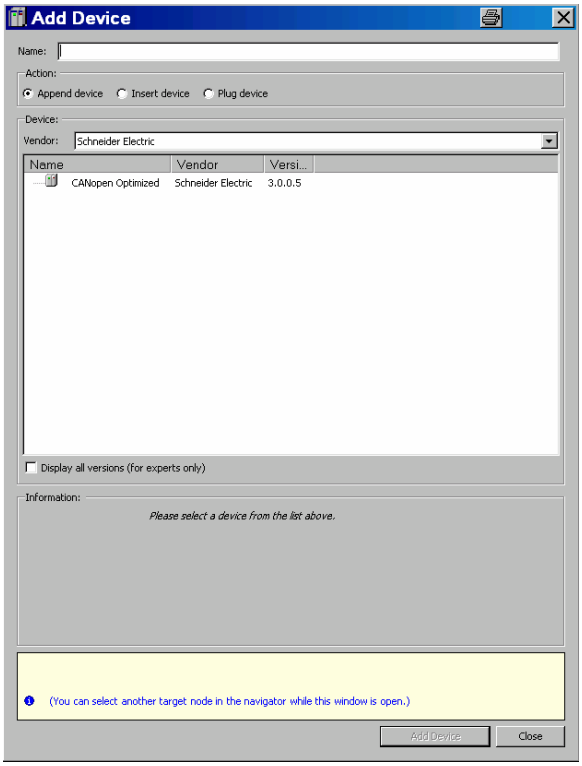
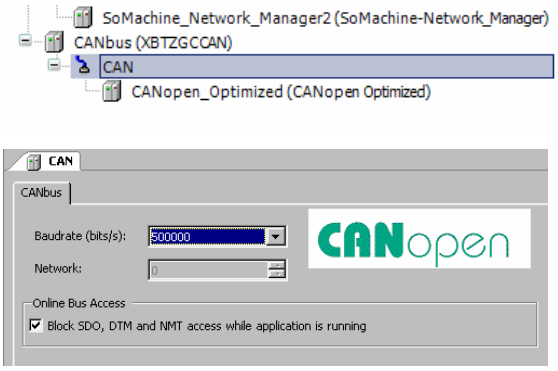
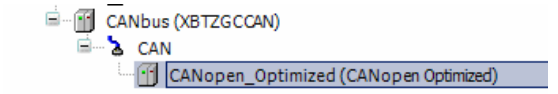
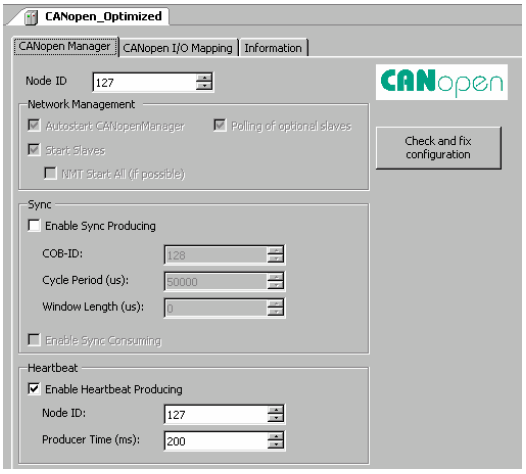
1	Right click on **Optimized_CANopen_XBTGC→ Add Device...**	

2	Select the path HMI Controller: HMI Controller → XBTGC Series → **XBTGC2230** and press **Add Device** after the HMI Controller is created in the project browser press **Close** the finish the dialog.	
3	After instantiating the HMI controller device XBTGC2230 the following tree is shown: • XBTGC2230 • HMI Application • PLC Logic • Embedded Functions • COM1 • Ethernet • USB	

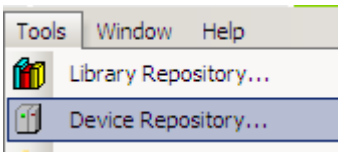
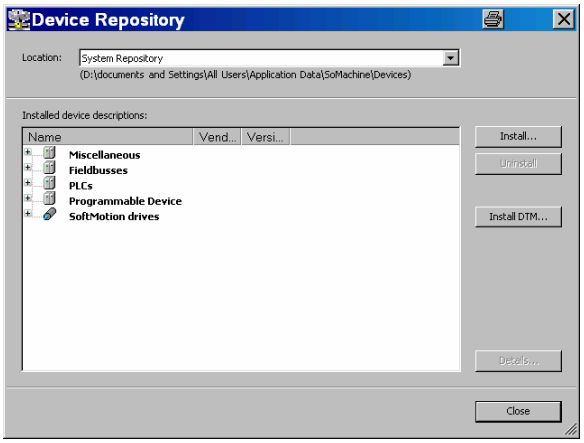
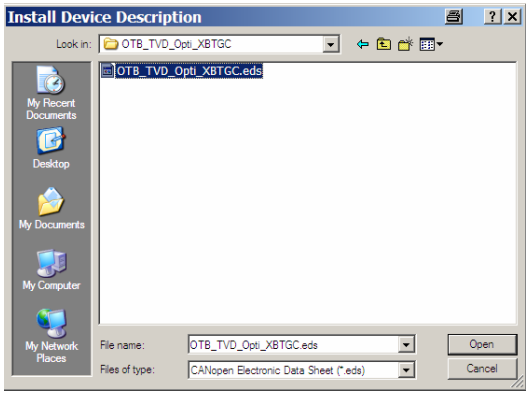
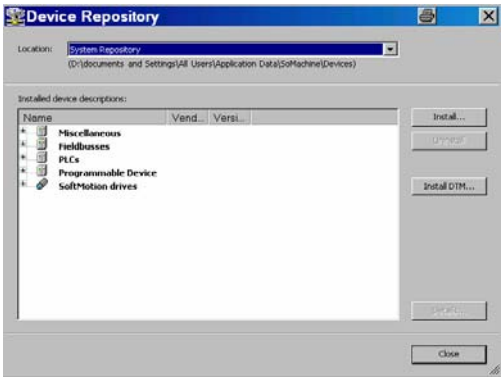
Add the CANopen fieldbus

1	In the device browser right click on **XBTGC2230→** **Add Device...**	

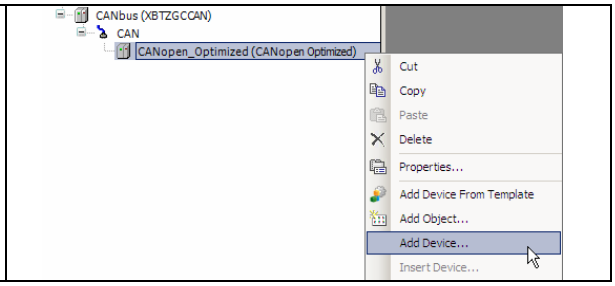
2	Select the CANopen master module in the path: TM2 Expert I/O Modules→ **XBTZGCCAN** and press **Add Device** **Note:** The CANopen Manager is automatically added if the XBTZGCCAN is added.	
3	In the device browser right click on **CAN→ Add Device...**	

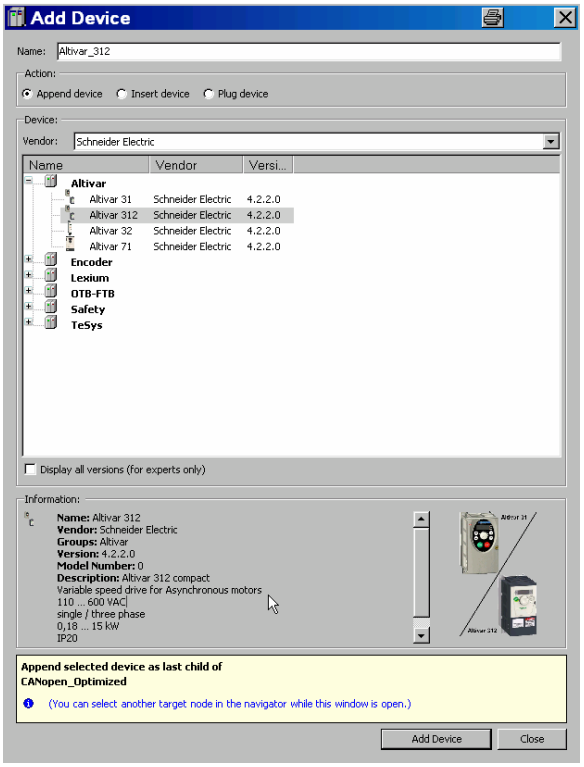
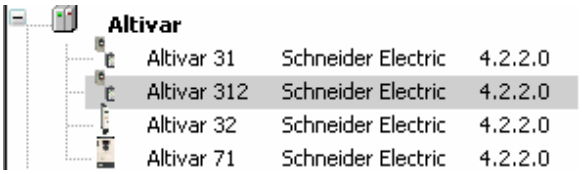
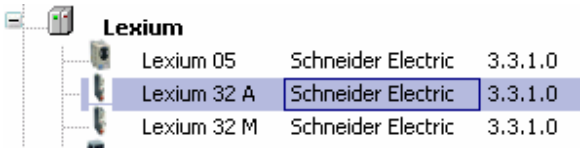
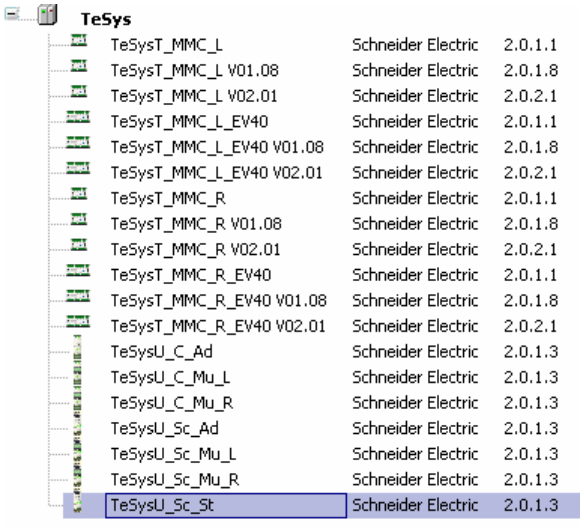
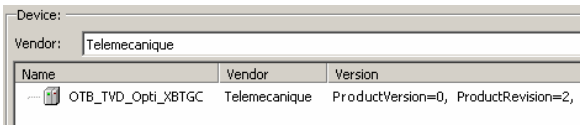
4	Select **CANopen Optimized** and press **Add Device** after the CANopen Manager is created in the project browser press **Close** the finish the dialog.	
5	In the device browser click on **CAN** to open the **CANbus** configuration tab. Set the **Baudrate** of the CANopen bus, by selection of **500000** as the **Baudrate.**	
6	Double click the **CANopen_Optimized** in the browser**.**	
7	Select the tab **CANopen Manager** and set **Node ID: 127** Check the box for **Enable Heartbeat Producing,** set the **Node ID** to **127** and the **Heartbeat time** to **200** ms**.**	

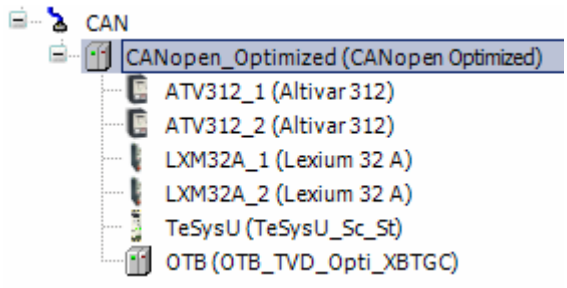
Import the OTB EDS file

1	To use the extended OTB island (configured by Advantys Configuration Software) you have to import the OTB eds file. Select **Tools→ Device Repository**…	
2	In the **Device Repository** select **Install…**	
3	Select the OTB EDS file. In this project the OTB EDS file is named **OTB_TVD_Opti_XBTGC.eds** Press **Open**	
4	Press **Close**	

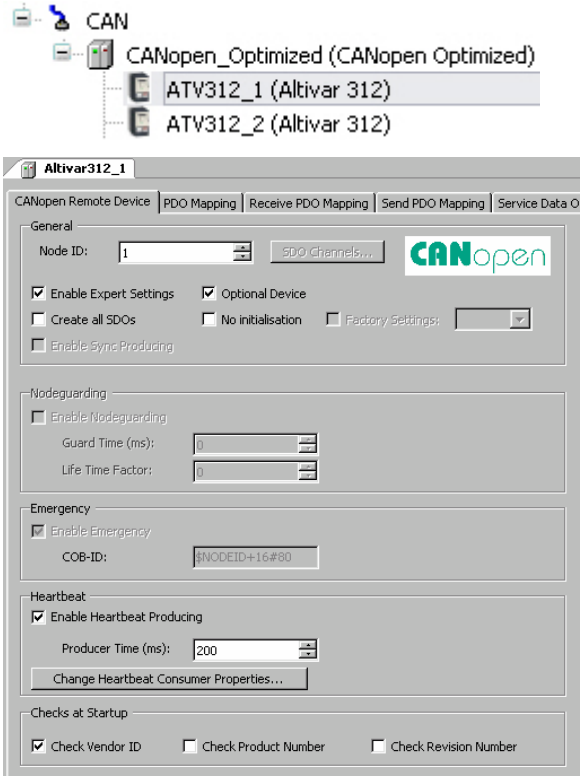
Add CANopen Devices

1	Right click on **CANopen_Optimized** in the browser and select **Add Device…** in the pop-up menu.	

2	Select the device, that you wish to connect to the CANopen bus. E.g. the Altivar 312 in path **→Altivar →Altivar 312** In this project the following devices are connected to the CANopen bus: **2x Altivar 312** **2x Lexium 32A** **1x TeSysU_Sc_St** **1x OTB_TVD_Opti_XBTGC** Add each device by clicking on **Add Device**. Once you have added all devices click on **Close.** **Note:** To change the default CANopen device name: Write in the field of the **Add Device → Name ATV312_1, ATV312_2, LXM32A_1, LXM32A_2, TeSysU and OTB** **Note:** The new type of OTB device (imported by EDS file) is located under: **Device → Vendor→ Telemecanique**	    

3	The new devices are now listed under **CANopen_Optimized** in the browser. To configure the devices, double click on the specific item.	

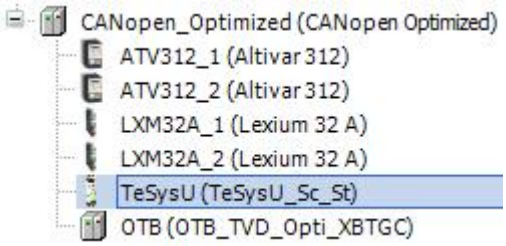
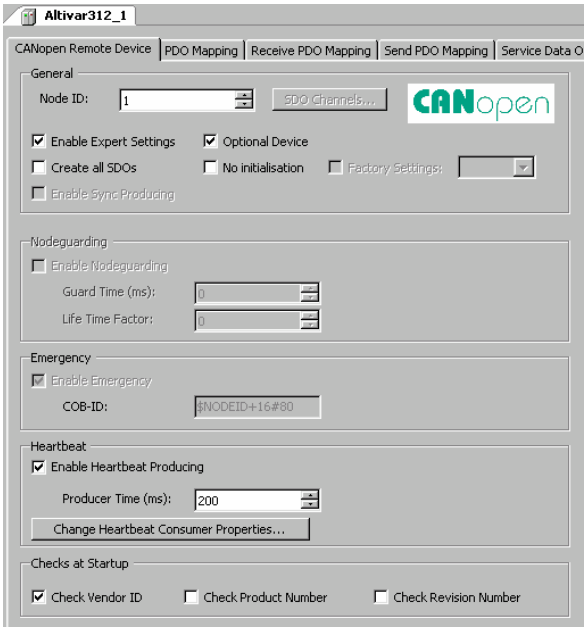
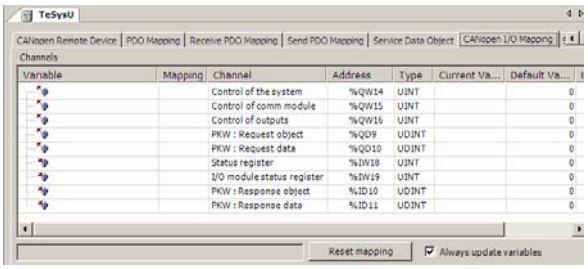
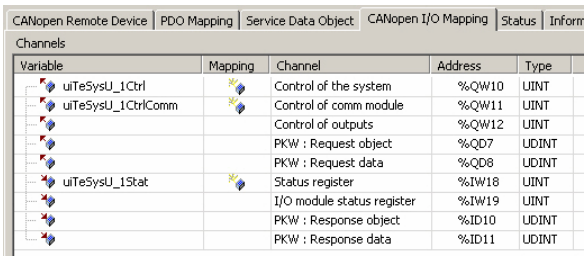
ATV312 CANopen configuration

1	Double click on the **ATV312_1** in the device browser. **Note:** In this project PLCopen EDS files are used. For this reason all PDO settings remain at their factory settings. Set the **Node ID** to **1** (Node ID for the Altivar 312 is **1 and 2)** Check **Enable Expert PDO Settings** and **Enable Heartbeat Producing.** Select **200** for the **Heartbeat producer time**	
2	Go to the **CANopen I/O Mapping** tab and check: Selected **Always update variables** and close the dialog.	

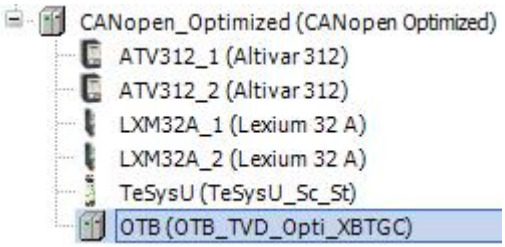
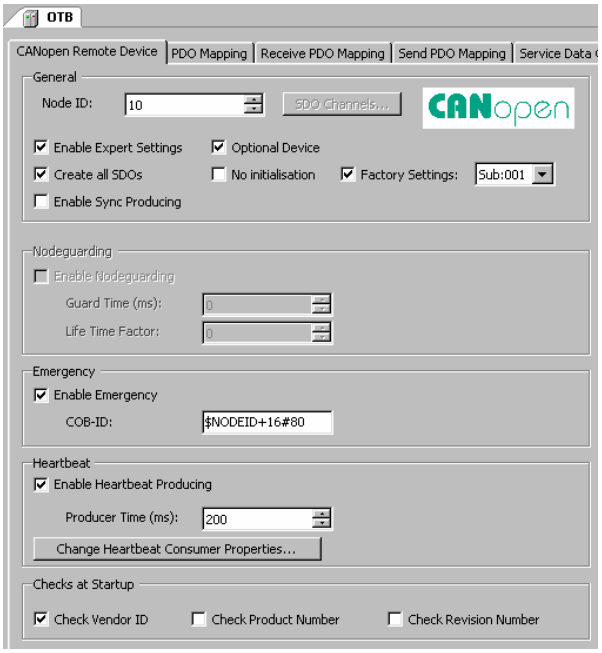
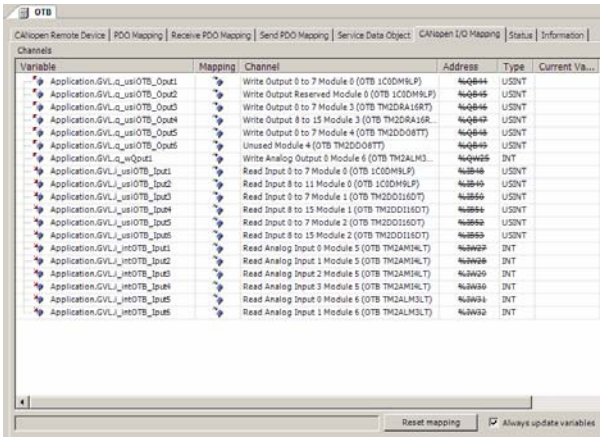
Lexium 32A CANopen configuration

1	The configuration for the Lexium 32A is done in the same way as the ATV312 configuration. The only differences are the **CANopen Node ID: 3 and 4**.

TeSysU CANopen configuration

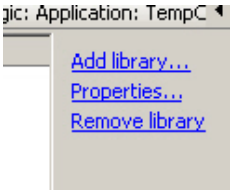
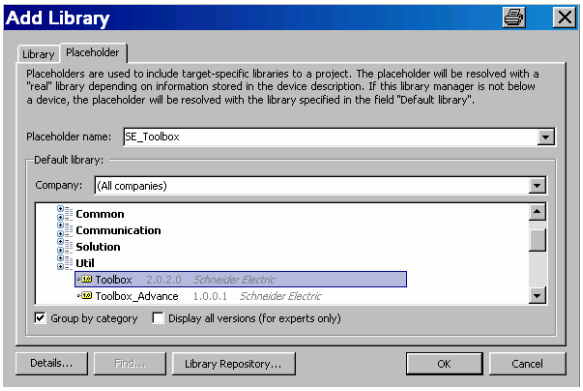
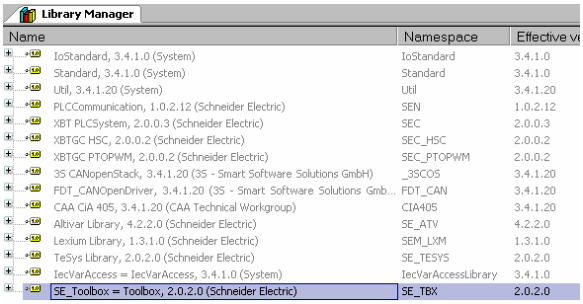
1	To configure the TeSysU CANopen double click on **TeSysU** in the browser and configure dialog opens.	
2	Select **Node ID 5.** In the configuration dialog on the **CANopen Remote Device** tab: Check **Enable Expert PDO Settings** and **Enable Heartbeat Generation.** Select **200** for the **Heartbeat producer time.**	
3	Go to the **CANopen I/O Mapping** tab and check: To update the variables with the newest I/O data check **Always update variables.** Create the following variable by double click in the **CANopen I/O Mapping** Tab**:**	
4	**uiTeSysU_1Ctrl** for channel **Control of the system**. **uiTeSysU_1CtrlComm** for channel **Control of the comm module.** **uiTeSysU_1Stat** for channel **Status register**.	

OTB CANopen configuration

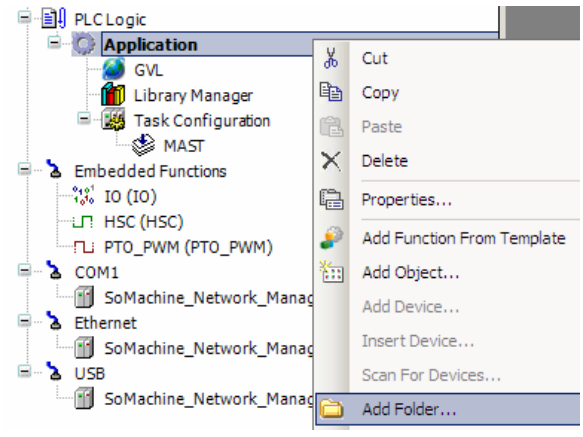
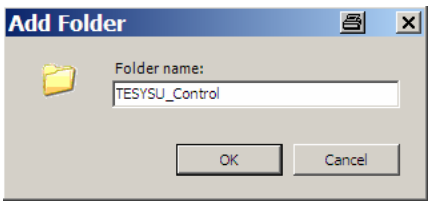
1	To configure the OTB double click on **OTB** in the browser.	
2	In the **CANopen Remote Device** tab Select **Node ID 10.** Check **Enable Expert PDO Settings, Create all SDOs, Factory Settings** and **Enable Heartbeat Producing.** Select **200** for the **Heartbeat producer time**	
3	Change to the **CANopen I/O Mapping** tab and enable **Always update variables**. Insert the variables by double click in the **CANopen I/O Mapping** Tab**:** e.g **Application.GVL.q_usiOTB_Oput1** for Write Output 0 to 7 Module 0 or **Application.GVL.i_usiOTB_Iput1** for Read Analog Input 1 Module 5	

Add Toolbox Library

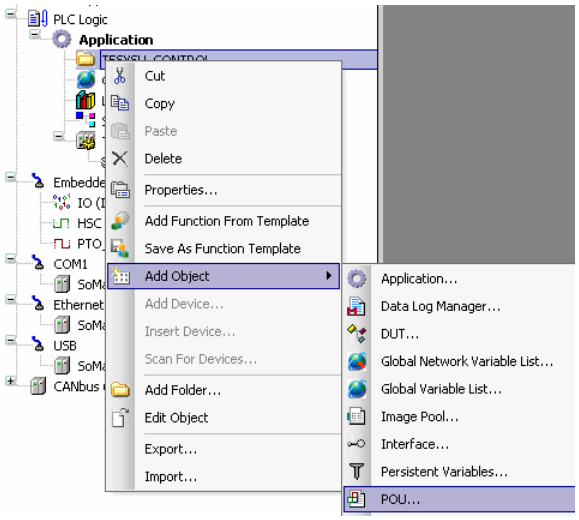
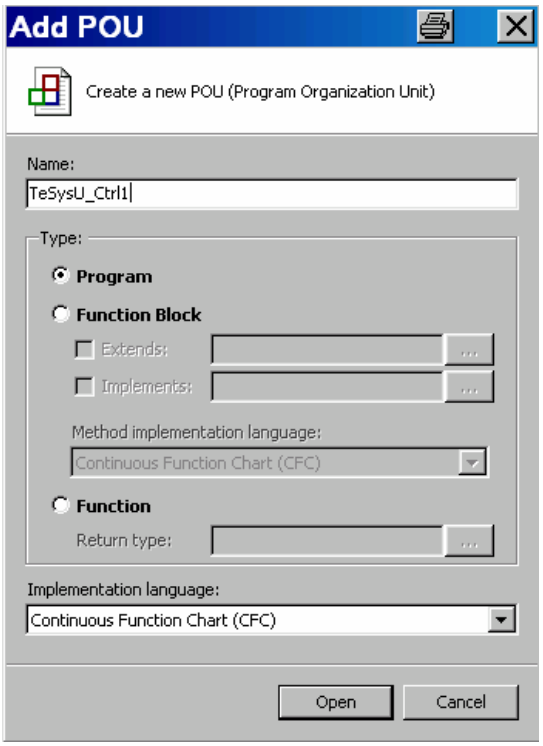
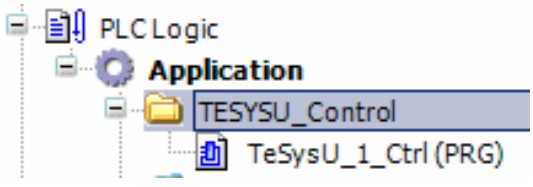
1	To use additional function blocks you need the appropriate libraries. These can be inserted by double clicking on **Library Manager** in the device browser.	

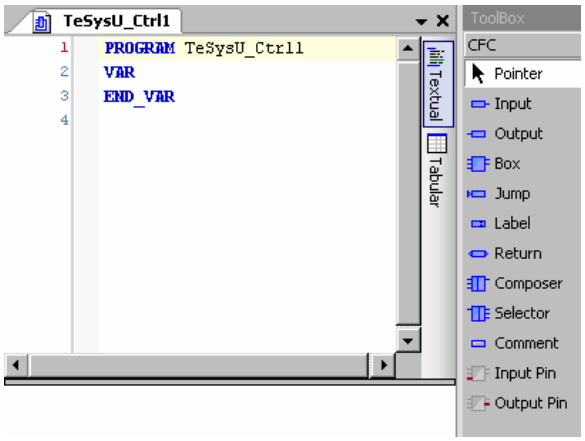
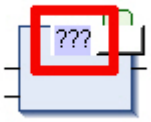
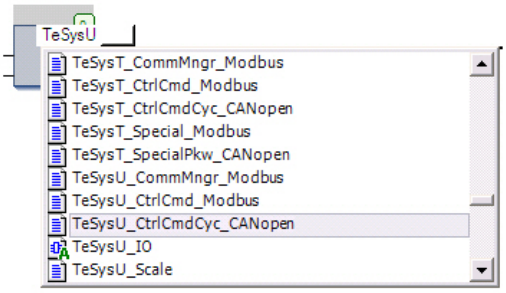
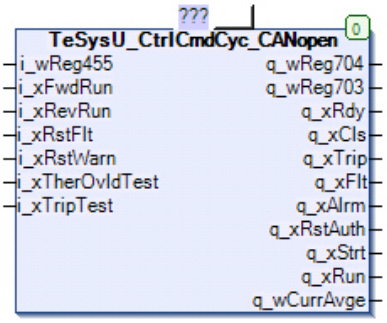
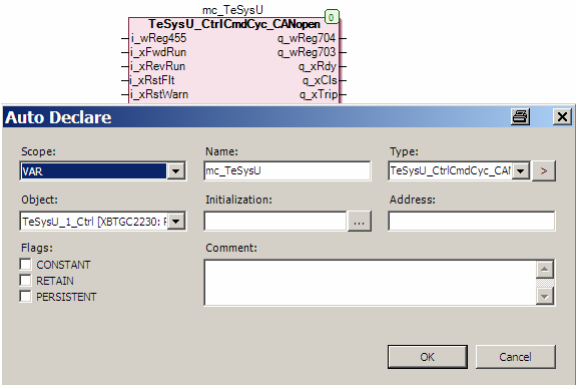
2	In the Library Manager click on **Add library…**	
3	In the **Add Library** dialog select: **Placeholder** tab select: **Placeholder name: SE_Toolbox** select Company**: Schneider Electric** select: **Util→ Toolbox** for the Toolbox blocks Click on **OK** to add the library.	
4	Now the new library can be seen in the Library Manager.	
5	To include additional libraries, repeat steps 1 through 4.	

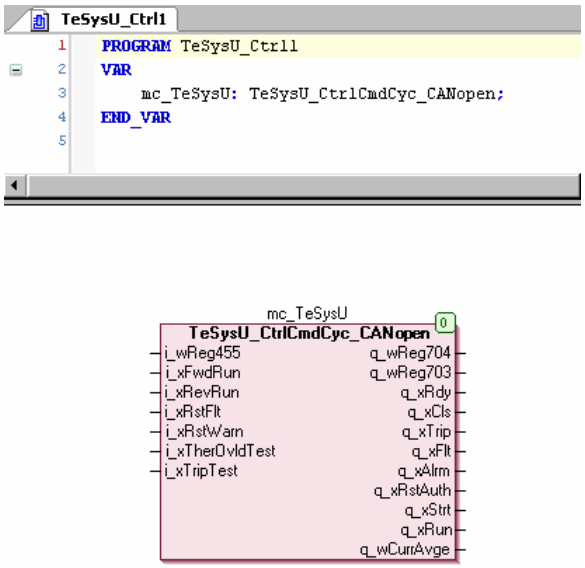
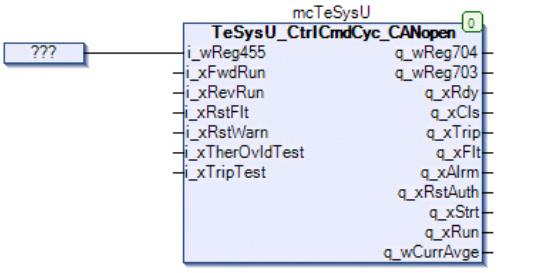
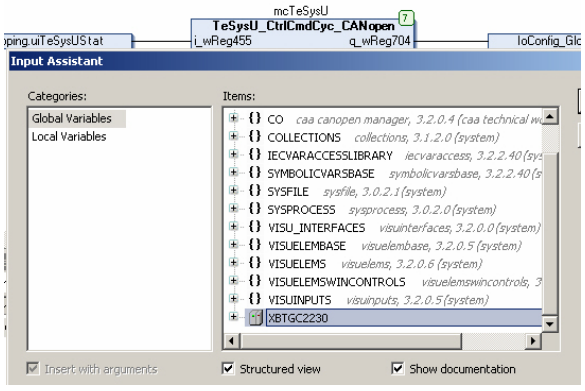
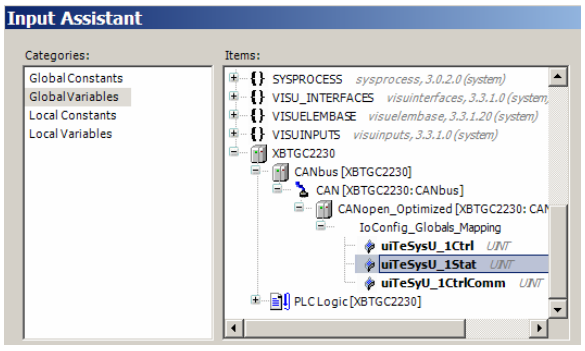
Add Folder

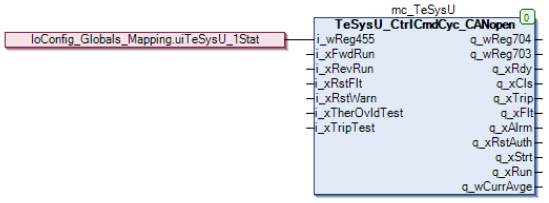
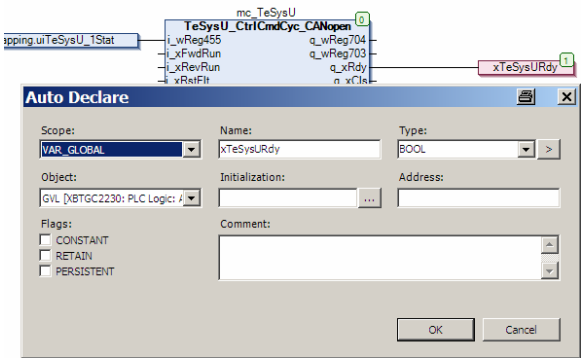
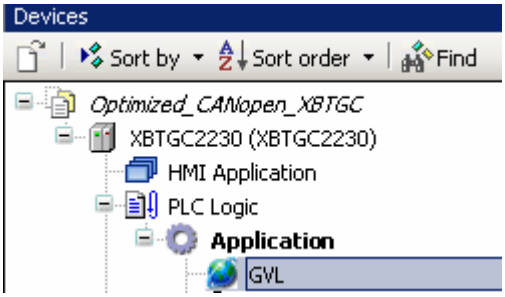
1	In the browser right click on **Application→ Add Folder…**	
2	Type in the Folder name: e.g. **TESYSU_Control.** Click on **OK.**	
3	To include additional folders, repeat steps 1 through 2	

Add POU

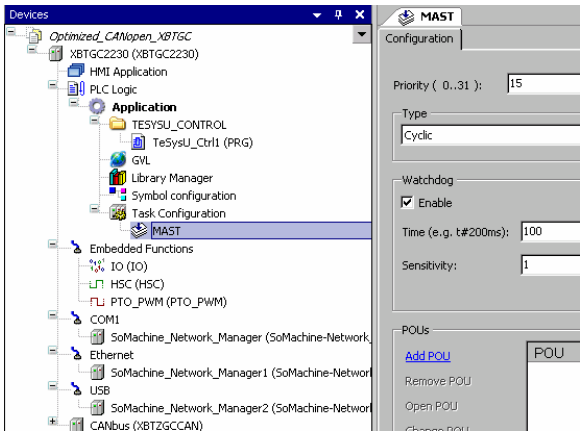
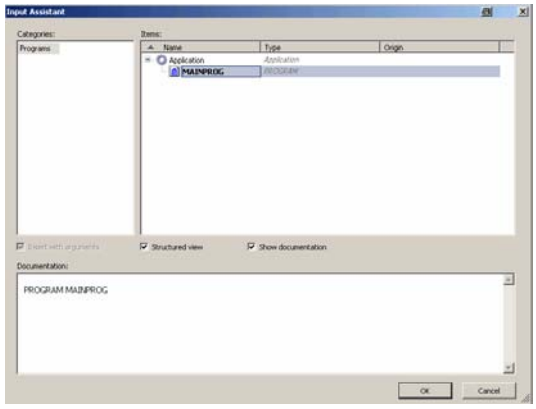
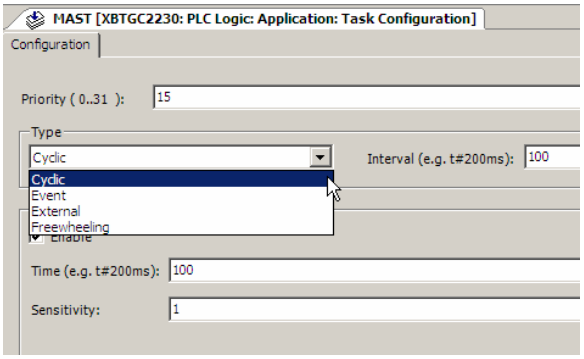
1	In the browser right click on **Application**→ on folder **TESYSU_Control** → **Add Object**→**POU**	
2	In the Add POU dialog select a **Name.** As **Type** select **Program** and as **Implementation language** select **Continuous Function Chart (CFC)** (or other language if required). Click on **Open.**	
3	The new POU **TeSysU_1_Ctrl** is now visible under **Application** in the browser**.** Double click on **TeSysU_1Ctrl** to open it.	

4	The upper frame displays the declaration section. The lower frame is for programming. On the right side is the **ToolBox window.** Use drag and drop to place example templates in the programming section.	
5	Once you have placed a template e.g. “Box” in the programming section click on **???**.	
6	Type a name of the function or function block. When the first letters are typed a pop-up menu opens with hints for the name. In this project a **TeSysU_CtrlCmdCyc_CANopen** was chosen. This FB controls the TeSysU.	
7	To instantiate the FB click the **???** and type in the instance name (for example mcTeSysU). Now press Enter.	
8	The **Auto Declare** dialog opens. If you wish to add a comment you can do this in the **Comment** box**.** Click on **OK** to create the instance.	

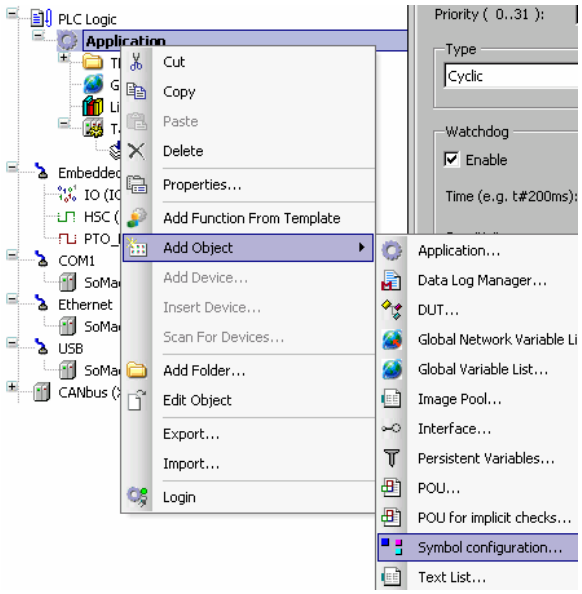
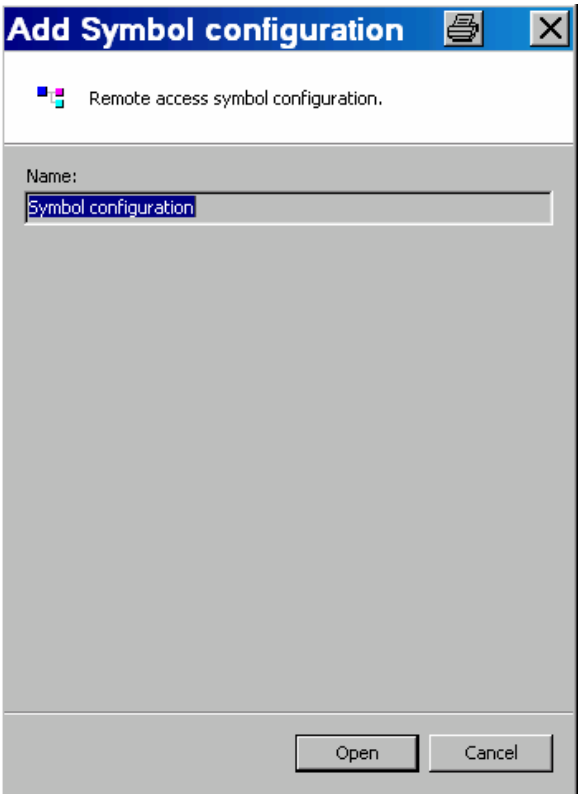
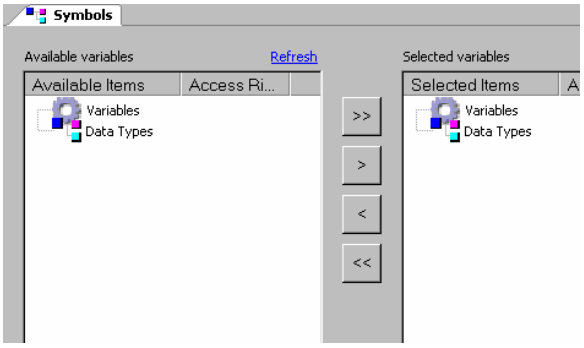
9	The new FB **mc_TeSysU** is instantiated in the declaration section of the TeSysUNo1.	
10	To connect a variable to an input place an input field from the **ToolBox window** to the input side of the FB and connect the input box to the FB input.	
11	Click the input field and press **F8 (** or select **Edit→Input Assistant….).** The **Input Assistant** is displayed.	
12	In the **Input Assistant,** select **Global Variables→** **XBTGC2230→** **CANbus→CAN→** **CANopen_Optimized→** **IoConfig_Globals_Mapping** and then double click on the variable. In this project the variable is the status data of the TeSysU, **uiTeSysU_1Stat.**	

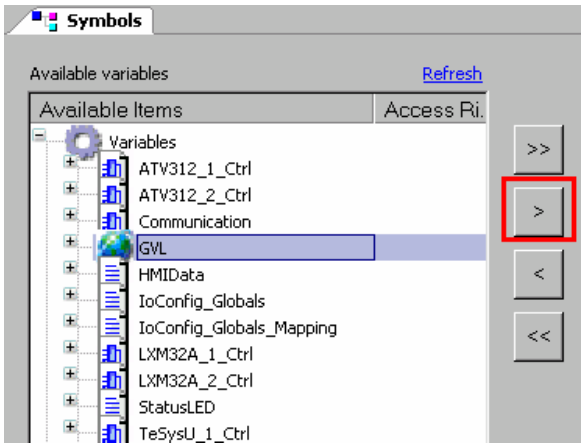
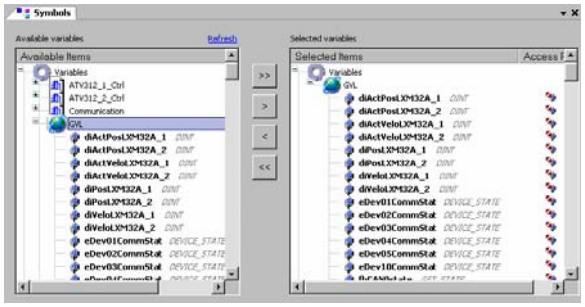
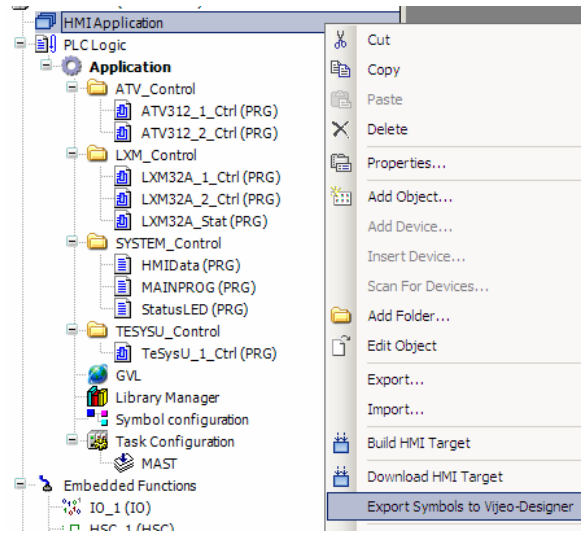
13	This image shows the FB with the connected input.	
14	Output definition is similar to input definition, but here we create a new variable. Click the output field, type in the name of the variable and press enter. In the **Auto Declare** dialog select the **Scope**, the **Name** and the **Type.** In this example **VAR_GLOBAL** is chosen as **Scope.** When finished click on **OK.**	
15	The **VAR_GLOBAL** variables are located in the **GVL** (global variable list). All variables located in this list can be accessed throughout the whole **Application**. If the variables are located in the POU, they can only be accessed by the POU (local variables).	
16	**Note:** Repeat the step1 to 15 for all needed new POU's. The POU **MAINPROG** includes all program calls for the created POU's. List of used POU's in this application: • Communication • HMIData • StatusLED • ATV312_1_Ctrl • ATV312_2_Ctrl • LXM32A_1 • LXM32A_2 • TeSysU_1_Ctrl	

Task Configuration

1	Before you can start working with the new POU you have to add it to a task. Here, the POUs are added to the **MAST** task. To do this double click the **MAST** task in the browser and click on **Add POU** in the Configuration tab.	
2	Select **Categories Programs** and select the POU Application→ MAINPROG in the **Items** list. Then click on **OK**.	
3	Now the POU is in the **MAST** task. In the upper part of the **MAST** task configuration you can change the **Type** of the task. In this project it is **Cyclic** with **Interval 100 ms.**	

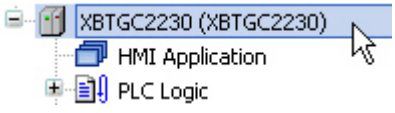
Configure controller ↔ HMI data exchange

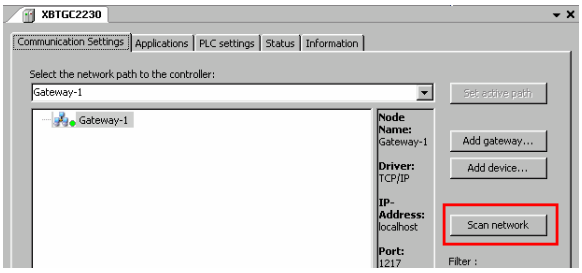
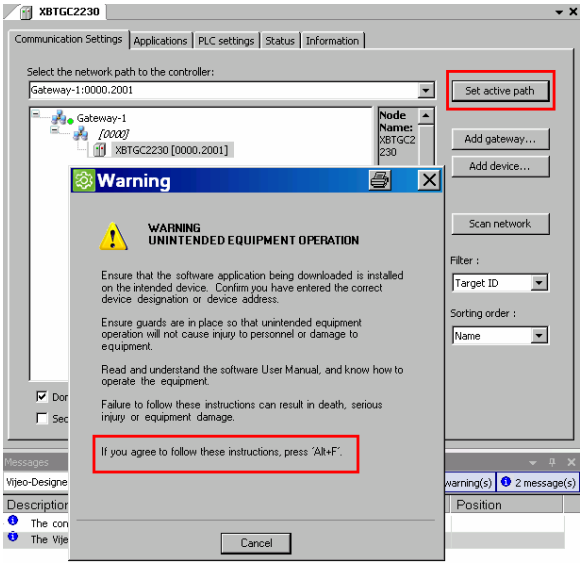
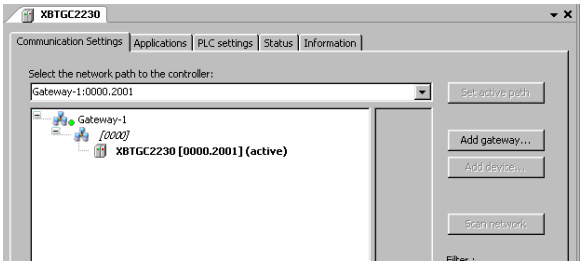
1	In the browser right click on: **Application→ Add Object → Symbol configuration…**	
2	In the Add Symbol configuration dialog click on **Open**.	
3	Click on **Refresh** in the now open **Symbol configuration.**	

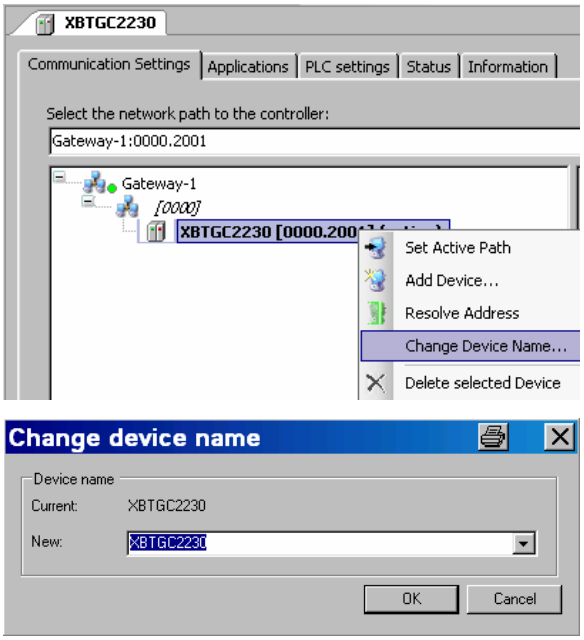
4	All Variables created in the user program are shown in the **Available variables** list. In this project all variables are global variables and as such are located in the **GVL** folder. To export variables to the HMI, select them and click on **>**.	
5	The right frame lists the selected **Variables** which are to be used in the HMI.	
6	In the browser right click on **HMI Application → Export Symbols to Vijeo-Designer**	

Communication Settings

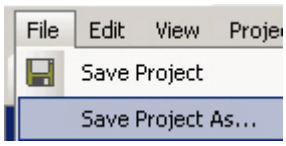
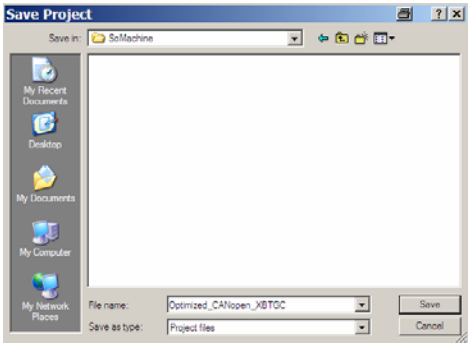
XBTGC→ PC

1	To configure the communication gateway, double click on **XBTGC2230** in the Devices browser.	

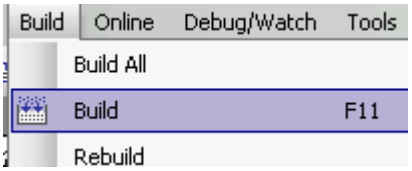
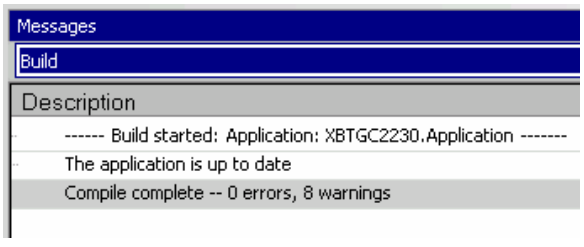
2	Select **Gateway-1** and click on **Scan network**. **Note:** Confirm that the HMI Controller is connected to the PC using XBTZG935. During the scan, the **Scan network** button is inactive. When the scan is finished, the **Scan network** button becomes active again and the devices that have been detected are listed under **Gateway-1**.	
3	Select the HMI controller that is being used and click on **Set active path**. A hazard message popup window appears.	
4	The HMI controller is now indicated in bold text and marked (**active)**.	

5	**Note:** If you would like to change the default name of your controller: rightclick on **XBTGC2230 → Change Device Name…** In the displayed pop-up window go to the **New:** field and enter the new unique name for your controller and press **OK.** In our example we kept the factory setting name.	

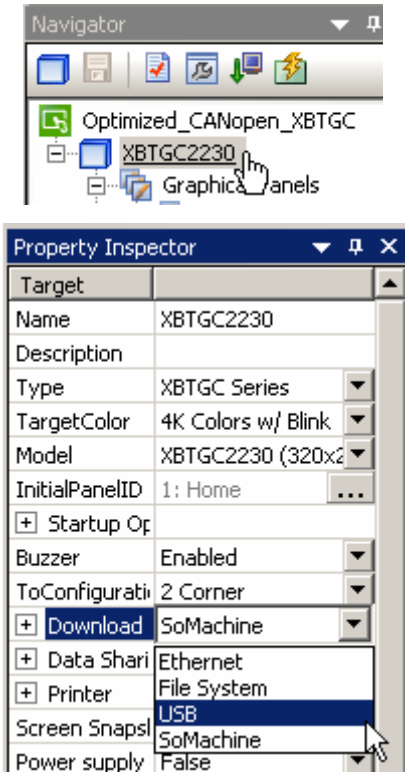
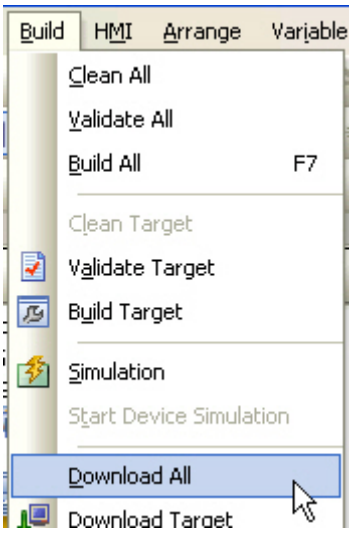
Save the Project

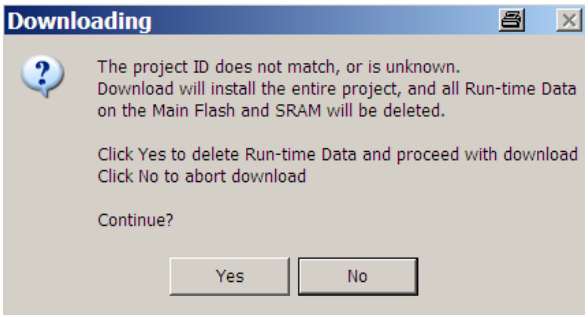
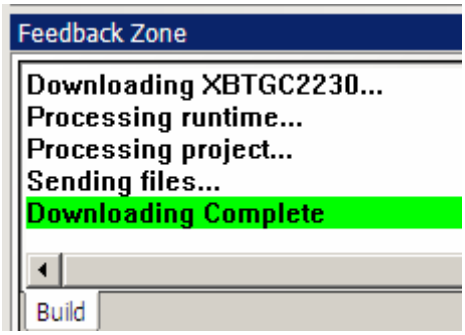
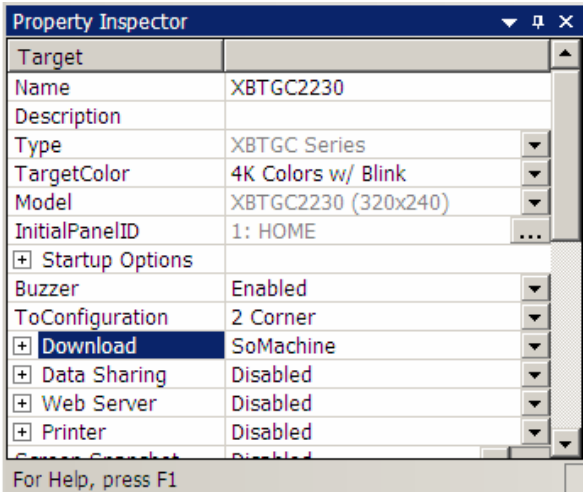
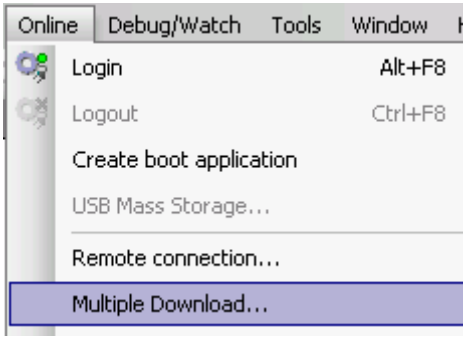
1	To save the project and change the name select: **File->Save Project As…**	
2	Enter the **File name** and click on **Save.** **Note:** As a default the project is saved under **My Documents**.	

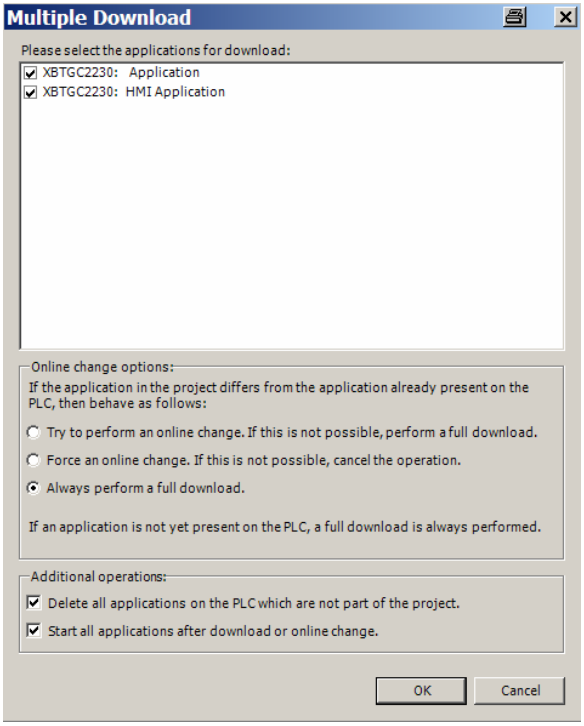
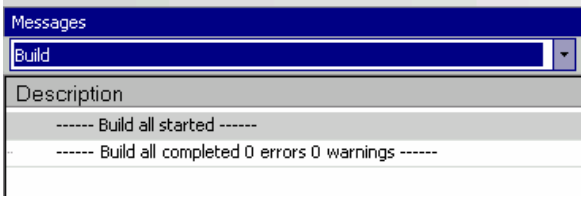
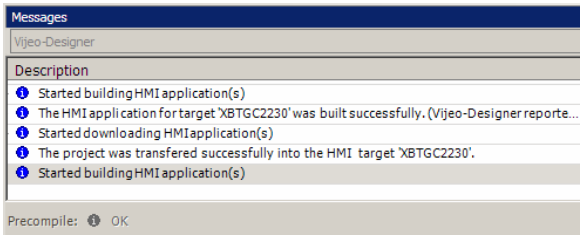
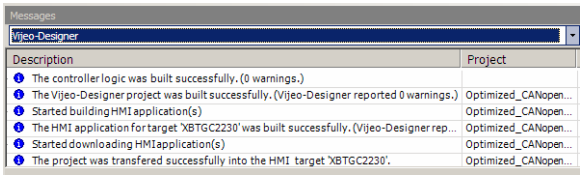
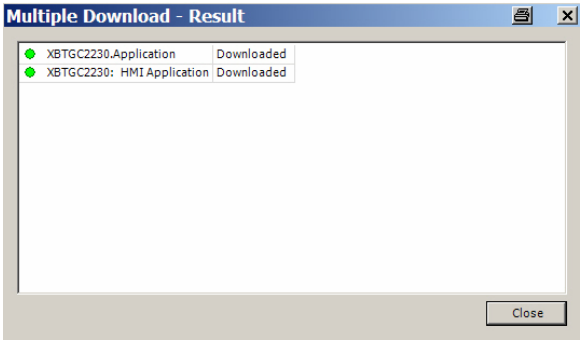
Build Application

1	To build the application click on **Build→ Build** **Note:** If you wish to build the whole project (HMI and PLC) click **Build all**	
2	After the build you are notified in the **Messages** field as to whether the build was successful or not. If the build was not successful there will be a list of compilation errors and / or compilation warnings in the **Messages** field.	

Download the Controller and HMI Applications

1	**Note:** If it is the first time you are downloading an application to the HMI Controller, you first have to download the latest runtime version to the HMI using Vijeo Designer. This first download is described in the following steps. If this is not the first download, go directly to step 7.	
2	In Vijeo Designer, select the target name in the **Navigator** to display its properties in the **Property Inspector**. In the **Property Inspector**, select **Download** via **USB**. **Note:** The PC must be connected to the HMI controller via the cable XBTZG935.	
3	Select: **Build→ Download All**	

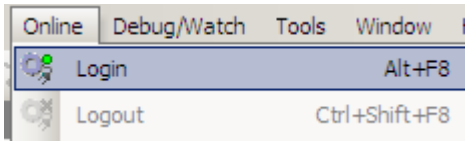
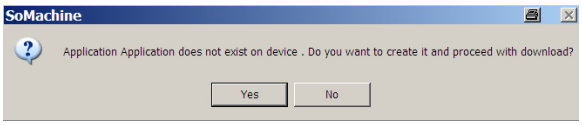
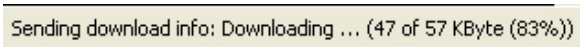
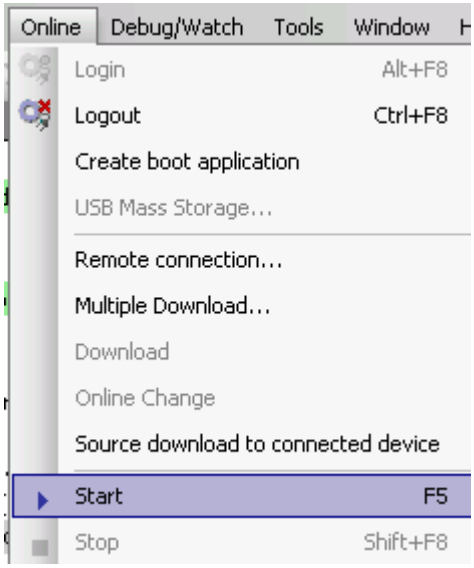
4	The **Downloading** dialog indicates that the runtime versions do not match. Start the download of the new version by clicking on **Yes**.	
5	The actual state of the download is displayed in the **Feedback Zone**.	
6	After the runtime download, change the **Download** connection in the **Property Inspector** back to **SoMachine.**	
7	In SoMachine: To download the application to the controller and the HMI click: **Online→** **Multiple Download…**	

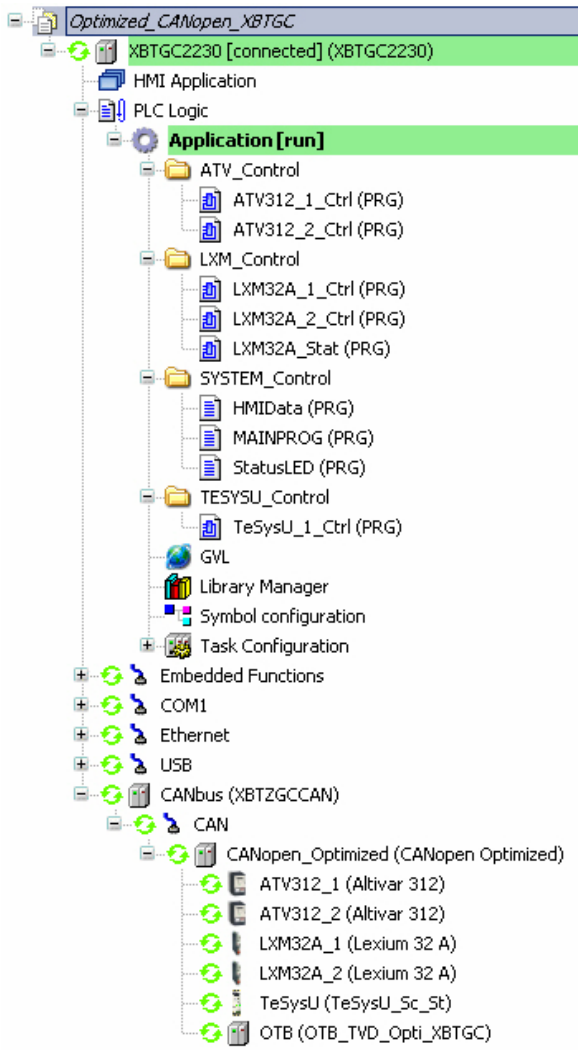
8	Check the boxes for the controller (**XBTGC2230: Application**) and the HMI (**XBTGC2230: HMI Application**) and select **Always perform a full download** Click on **OK to close the window**.	
9	Before the download starts, a **build** of the complete project is done. The result of the build is displayed in the **Messages** box.	
10	Once the download to the controller is finished, the HMI download starts.	
11	The result of the HMI download is displayed in the **Messages** box.	
12	The results of the download to the controller are displayed in the **Multiple Download – Result** window**.** Click on **Close** to close the results window**.**	

Note:

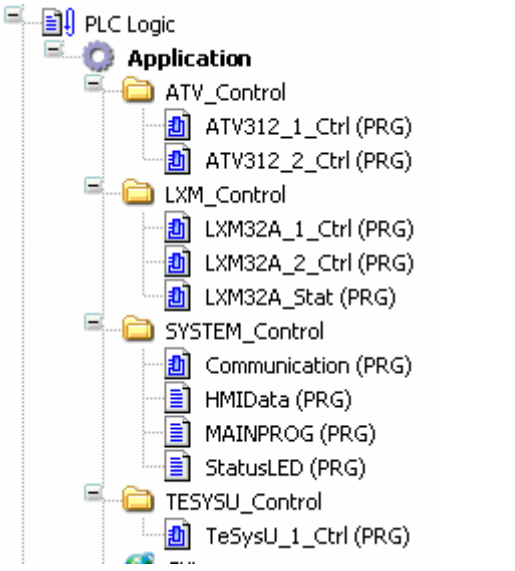
After Multiple Download the XBTGC HMI controller restarts. During this period the Login to XBTGC is not possible.

Login to XBTGC

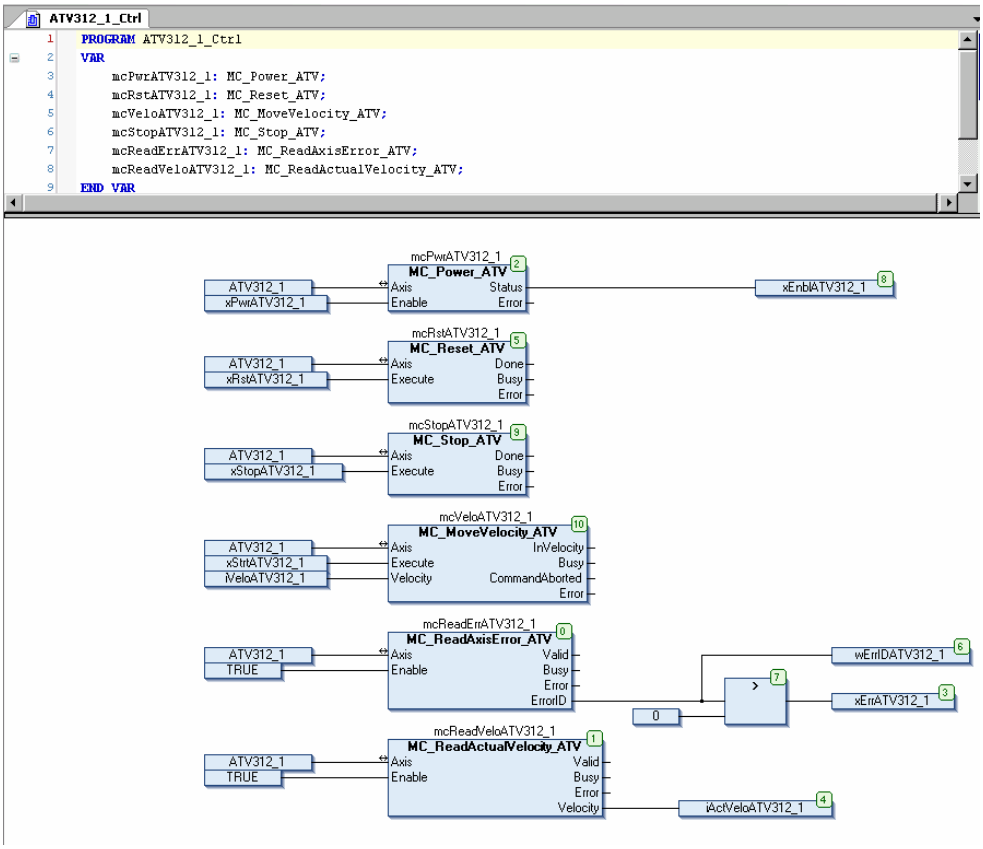
1	To login to the controller click **Online→ Login**	
2	SoMachine displays a message according to the state of the controller you are trying to log in to. The message indicates that there is no program in the device. You are asked to confirm whether to proceed with the download of the controller application into the controller. If you wish to overwrite the controller application then click **Yes** to confirm the download.	
3	The actual download status is displayed at the bottom left of the main window.	
4	To start running the application in the controller, choose **Online →Start**	

5	If everything is operating normally the devices and folders are marked in green otherwise they are marked in red.	

Application Overview

1	The image on the right shows the **Application** structure as it appears in the browser. Each function has its own entry in the browser.	

2	**POU ATV312_1_Ctrl** contains the control for a ATV312 via PLCopen FB's

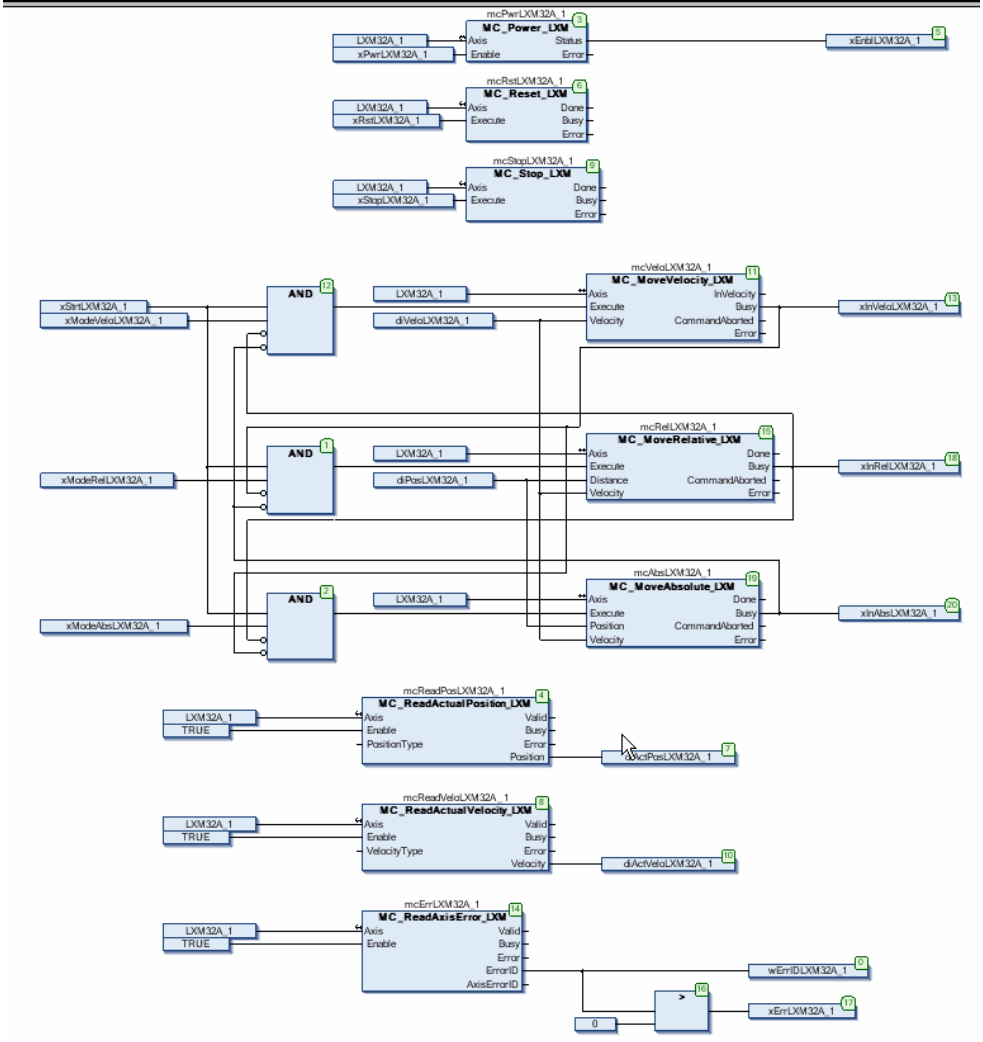


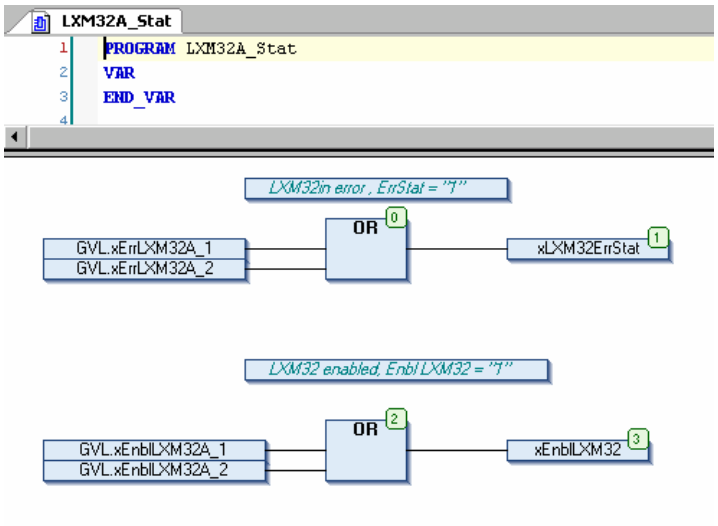
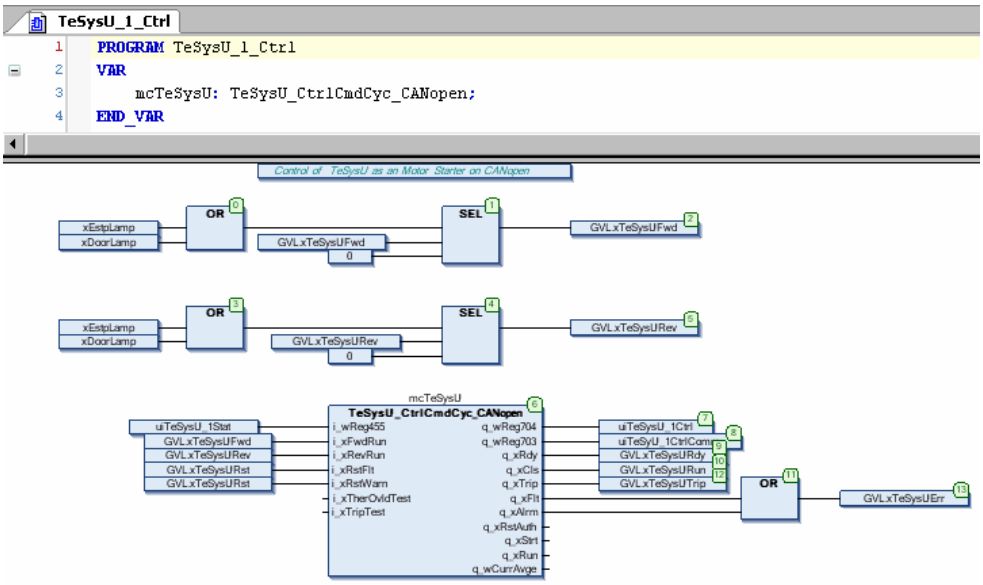
3

POU LXM32A_1_Ctrl contains the control for a **LXM32A** via PLCopen FBs

LXM32A_1_Ctrl

```
1   PROGRAM LXM32A_1_Ctrl
2   VAR
3       mcPwrLXM32A_1: MC_Power_LXM;
4       mcRstLXM32A_1: MC_Reset_LXM;
5       mcStopLXM32A_1: MC_Stop_LXM;
6       mcVeloLXM32A_1: MC_MoveVelocity_LXM;
7       mcRelLXM32A_1: MC_MoveRelative_LXM;
8       mcAbsLXM32A_1: MC_MoveAbsolute_LXM;
9       mcErrLXM32A_1: MC_ReadAxisError_LXM;
10      mcReadPosLXM32A_1: MC_ReadActualPosition_LXM;
11      mcReadVeloLXM32A_1: MC_ReadActualVelocity_LXM;
12  END_VAR
```



4	**POU LXM32A_Stat** contains the status for a **LXM32A**. 
5	**POU TeSysU_1_Ctrl** contains the control for a TeSysU 

6

POU HMIData contains the logic for the system initialization.

HMIData

```
PROGRAM HMIData
VAR
    BIT_AS_WORD1:BIT_AS_WORD;
    BIT_AS_WORD2:BIT_AS_WORD;

END_VAR
```

```
(* Interface to HMI variabls *)
xATV312_1_BusStatus :=  xDev01CommOK;   (*bus status of ATV312 1*)
xATV312_2_BusStatus :=  xDev02CommOK;   (*bus status of ATV312 2*)
xLXM32A_1_BusStatus :=  xDev03CommOK;   (*bus status of Lexium32A 3*)
xLXM32A_2_BusStatus :=  xDev04CommOK;   (*bus status of Lexium32A 4*)
xTeSysU_BusStatus   :=  xDev05CommOK;   (*bus stauts of TeSysU 5*)
xOTB_BusStatus      :=  xDev10CommOK;   (*bus stauts of OTB 10*)

(*Error signal FOR HMI*)
    xErr := xErrATV312_1 OR xErrATV312_2 OR xErrLXM32A_1 OR xErrLXM32A_2 OR xTeSysUErr;

(*Bus state signal for HMI*)
    xBusState := xLXM32A_1_BusStatus AND xLXM32A_2_BusStatus AND xATV312_1_BusStatus AND xATV312_2

(* Magelis XBGTGC internal Input/Output for HMI *)

BIT_AS_WORD1(
    B00:=xEStpLamp,
    B01:=q_Qput1 ,
    B02:=xDoorLamp ,
    B03:=q_Qput3 ,
    B04:=xPlntOper ,
    B05:=q_Qput5 ,
    B06:=q_xStartFWD ,
    B07:=q_Qput7 ,
    B08:=q_xStop  ,
    B09:=q_Qput9 ,
    B10:=q_xStartREV ,
    B11:=q_Qput11 ,
    B12:=q_Qput12 ,
    B13:=q_Qput13 ,
    B14:=q_Qput14 ,
    B15:=q_Qput15  ,
    W=>q_wQput1 );
```

7

POU StatusLED contains the indication of the architecture states.

StatusLED

```
PROGRAM StatusLED
VAR
    Blink:Blink;
    Blinker:BOOL;
END_VAR
```

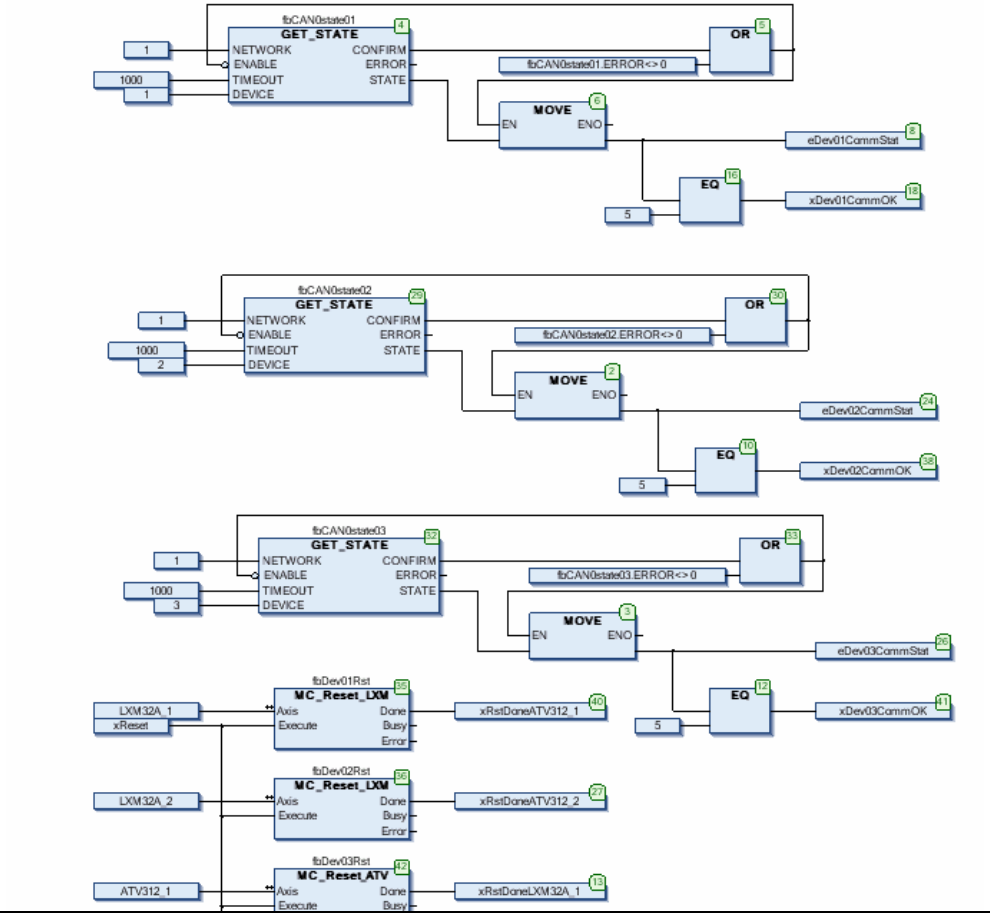
```
(*Blue E Stop LED*)
    xEstpLamp := NOT xEStpAct;  (*If E-Stop is pressed blue lamp is on*)

(*Blue door guarding LED*)
    xDoorLamp := NOT xDoorAct;  (*If Door is open blue lamp is on*)

(*Plant operational*)
    xPlntOper := xEnblATV312_1 OR xEnblATV312_2 OR xEnblLXM32A_1 OR xEnblLXM32A_2 OR xTeSysURun;

(* Status of on location control button *)
    q_xStartFWD:= i_xStartFWD;
    q_xStop:= i_xStop;
    q_xStartREV:= i_xStartREV;


(* Blink tact on internal XBTGC Output 14 + OTB output 7 *)
BLINK(ENABLE:=TRUE , TIMELOW:= T#10.0S, TIMEHIGH:=T#10.0S , OUT=>Blinker );
q_Qput14 := Blinker;
q_usiOTB_Oput1.7 := Blinker;


(* Link analog setpoint 0...255 to digital output3 byte *)
q_usiOTB_Oput3 :=  INT_TO_USINT (q_intOTB_Qput1);
```

8

POU Communication contains the indication of the device communication state.

Communication

```
1  PROGRAM Communication
2  VAR
3  fbDev01Rst: MC_Reset_LXM;
4  fbDev02Rst: MC_Reset_LXM;
5  fbDev03Rst: MC_Reset_ATV;
6  fbDev04Rst: MC_Reset_ATV;
7  END_VAR
```



9

POU MAINPROG contains the calls for the POU execution.

MAINPROG

```
1  PROGRAM MAINPROG
2  VAR
3
4  END_VAR
5
```

```
1  Communication();
2  HMIData();
3  StatusLED();
4  ATV312_1_Ctrl();
5  ATV312_2_Ctrl();
6  LXM32A_1_Ctrl();
7  LXM32A_2_Ctrl();
8  LXM32A_Stat();
9  TeSysU_1_Ctrl();
10
11
```

HMI

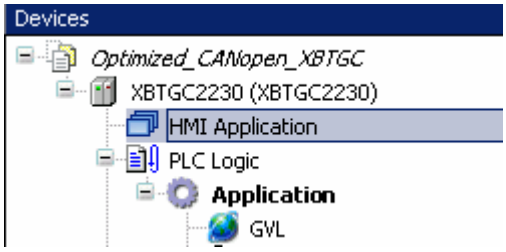
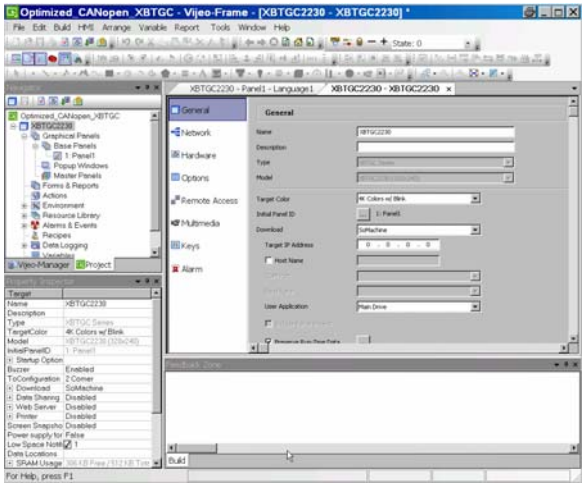
Introduction

This application uses a Magelis XBTGC2230T HMI controller. The HMI display is programmed using the software tool Vijeo Designer (integrated in SoMachine) and is described briefly in the following pages. For the connection between the PC and the HMI Controller use the cable XBTZG935.

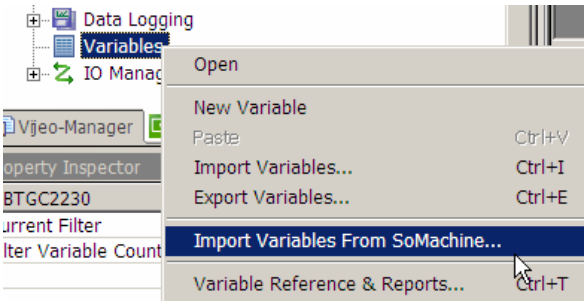
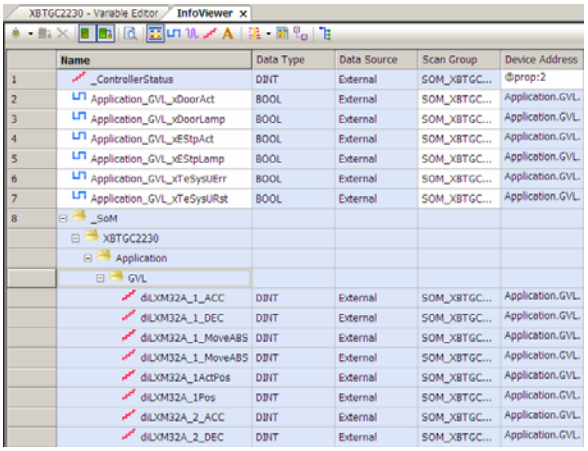
Setting up the HMI is done as follows:

- Main Window
- Imported variables
- Create a switch
- Create a numeric display
- Example screens

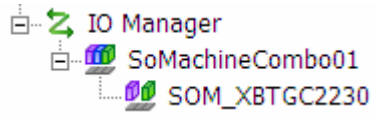
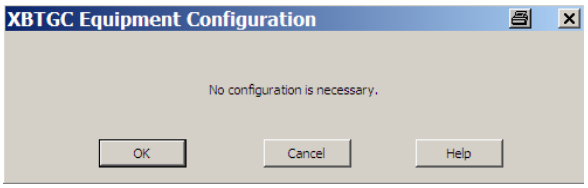
Main Window

1	Click in SoMachine browser on **HMI Application** switch to Vijeo Designer	
2	Vijeo Designer creates the HMI TargetView window. **Note:** The Target View window collects all target parameter settings in one window. The content is also shown in the Property Inspector but in a different way.	

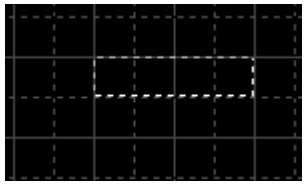
Imported variables

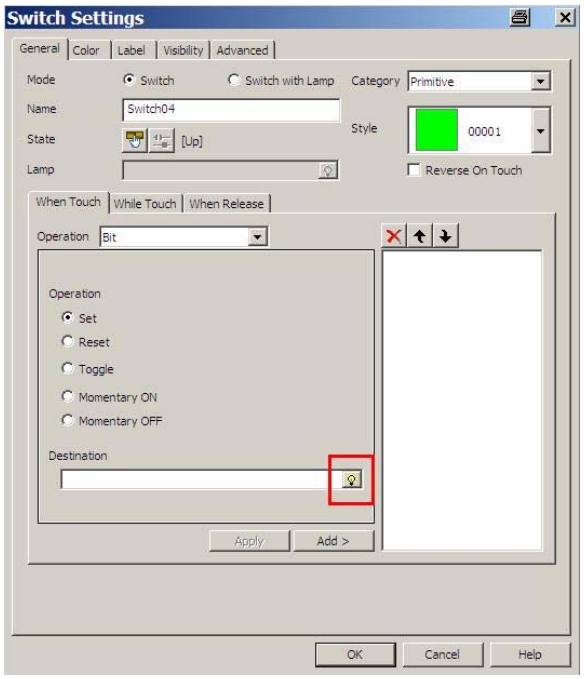
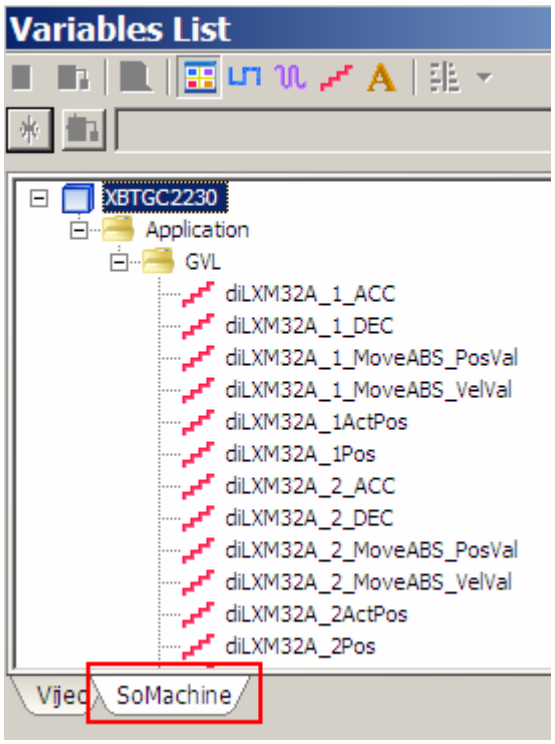
1	Right click in the browser on Variables and select **Import Variables From SoMachine…**	
2	The opened InfoViewer shows all present variables.	

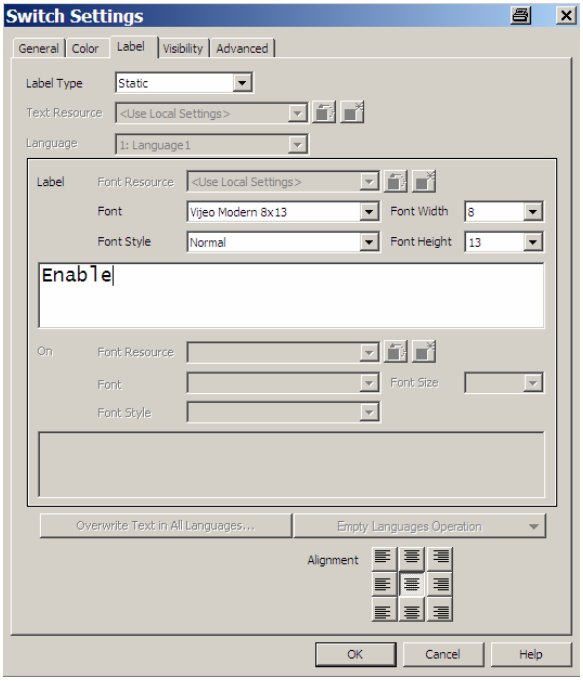
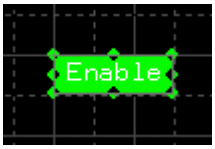
Communication settings

1	With these new variables Vijeo Designer creates a **SoMachineCombo01** for the communication with the PLC. Double-click on: **SOM_XBTGC2230** in the browser	
2	For XBTGC, no configuration is necessary. An internal communication link between the HMI controller and the HMI display is automatically generated by SoMachine. Press **OK**	

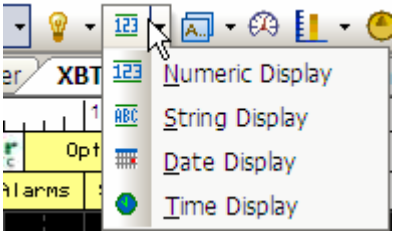
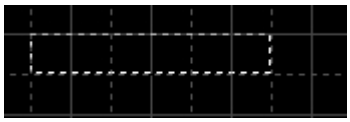
Create a switch

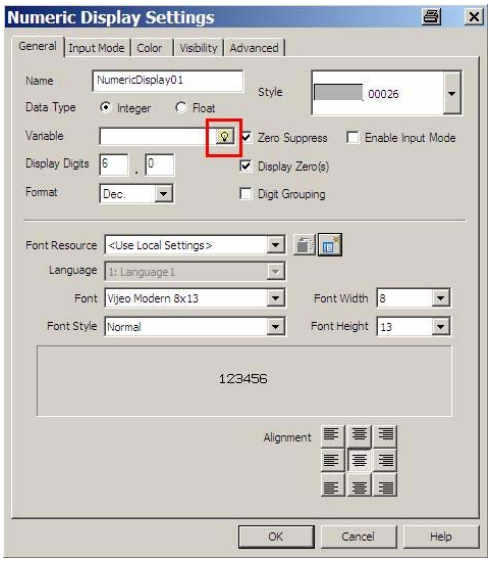
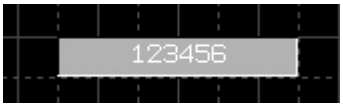
1	Select the **Switch** icon in the **Tool bar.**	
2	Select the position and dimension where you wish to place the button by opening a rectangle on the display and pressing enter.	

3	In the **Switch Settings** dialog, select the variable that should be linked (Lamp icon) to the button.	
4	Click on the bulb icon (as indicated in the image above) to open the **Variables List** dialog. Select the required variable and click **OK.**	

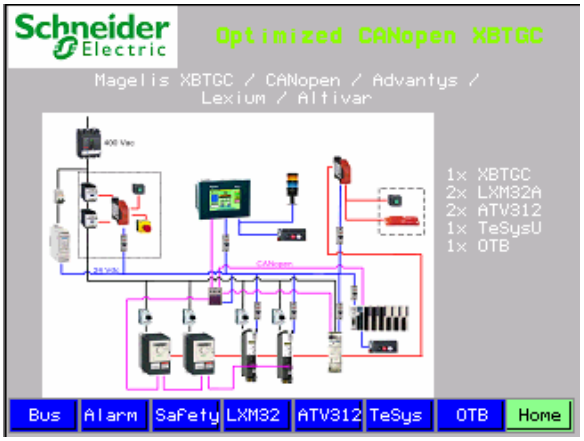
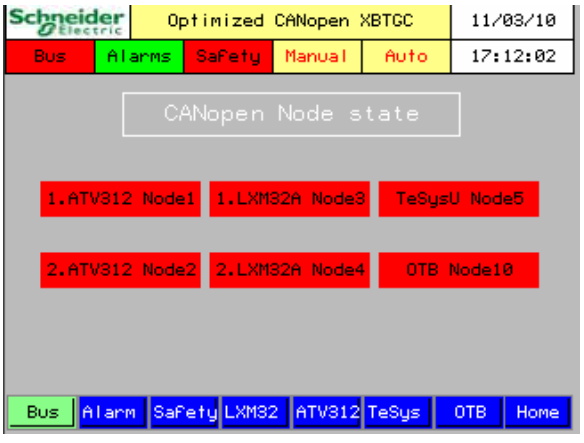
5	Go to the **Label** tab. Here select **Label Type: Static** and enter a name for the button, e.g. Enable. Once you have finished your settings click on **OK**.	
6	The display now shows the new button.	

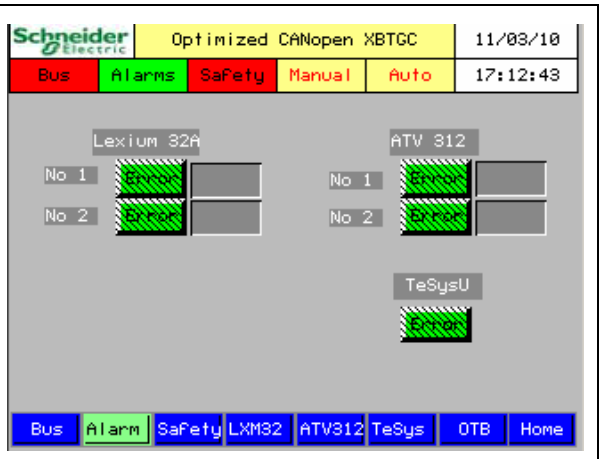
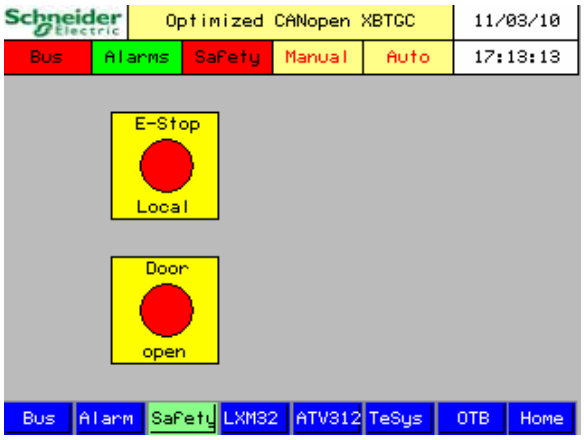
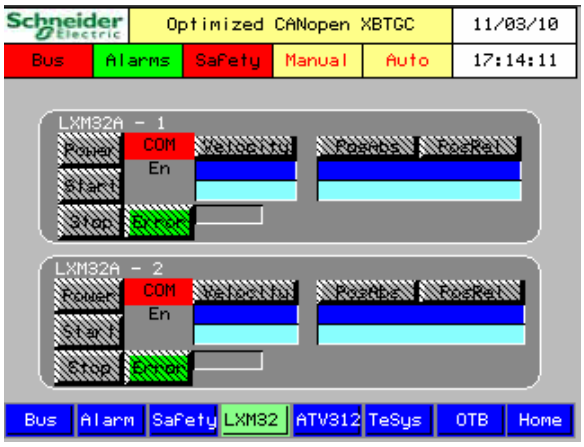
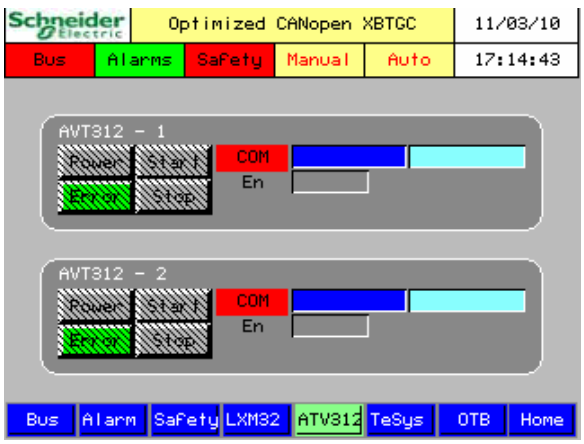
Create a Numeric Display

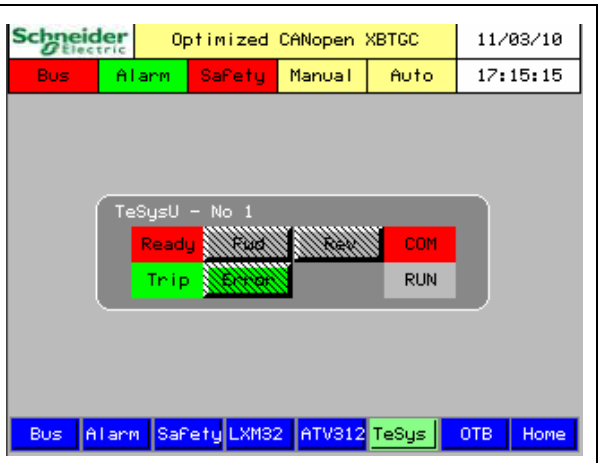
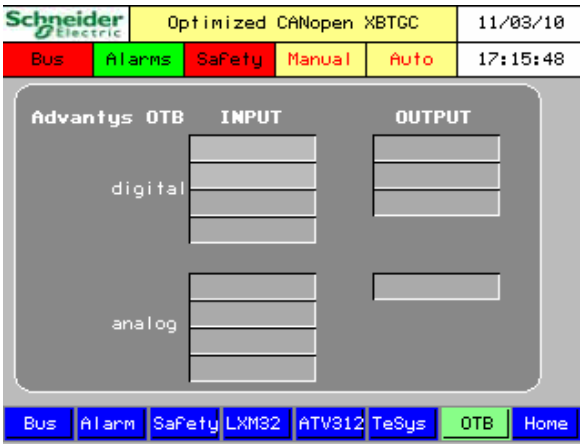
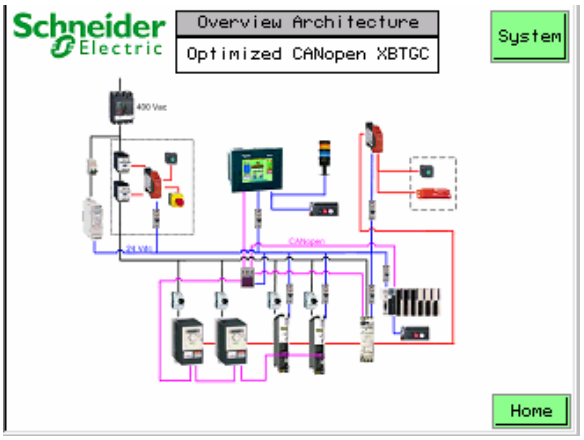
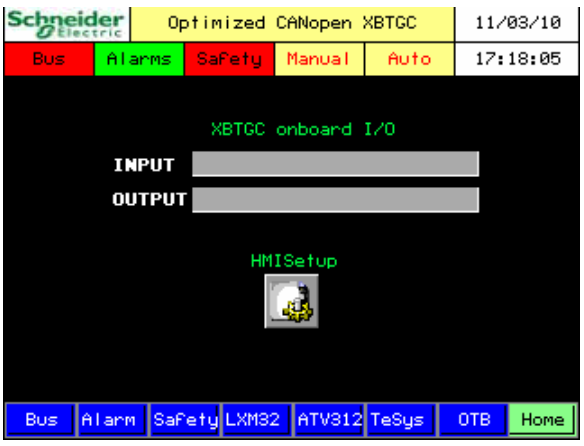
1	Click on the **Numeric Display** icon in the tool bar.	
2	Select the spot where you want to position the display by opening the rectangle and pressing **Enter.**	

3	In the **Numeric Display Settings** dialog go to the **General** tab. In **Display Digits** you can set the maximum number of the digits to be displayed for both integral and fractional part of the value. To link a **Variable** to the display click on the bulb icon to browse for a variable**.** Click **OK.**	
4	The display shows the new numeric display.	

Example screens

1	The **Home** page shows the CANopen architecture.	
2	The **Bus** page shows the state of all CANopen Nodes.	

3	The **Alarms** page shows if an alarm from the device is present.	
4	The “**Safety**” page shows the status of the Emergency Stop and Door Guard.	
5	Via the **LXM32** page it is possible to control both Lexium 32A servo drives.	
6	Via the **ATV312** page it is possible to control both Altivar 312 drives.	

7	Via the **TeSys** page it is possible to control the TeSysU.	
8	In the **OTB** page the actual I/O status is shown.	
9	If the CANopen architecture on the **Home** page is touched, the architecture overview opens. From this screen, it is possible to go to the HMI system settings by pressing **System.**	
10	This page shows in **XBTGC onboard I/O** status and via the **HMISetup** the setup of the HMI can be changed if needed.	

Devices

Introduction

This chapter describes the steps required to initialize and configure the different devices required to achieve the described system function.

General

Altivar 312 and Lexium 32A drives are configured by using the local control panel on the device itself.

The extended Advantys OTB IO island is configured by using the Advantys Configuration Software.

The Advantys OTB CANopen addresses & baudrate are configured by using the onboard rotary switches.

Note

If this is not a new drive you should re-establish the factory settings. If you need instructions on how to do this, please read the drive documentation.

Be sure that the controller is in STOP state before parameterizing the drives.

Altivar 312

Introduction

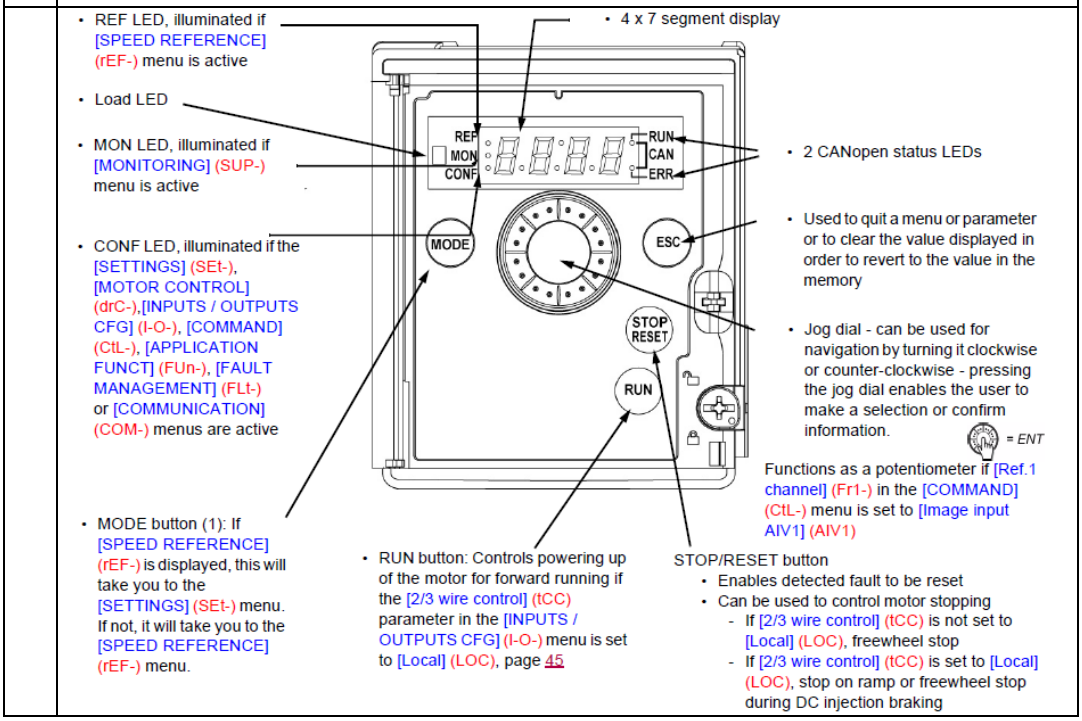
The ATV312 parameters can be entered or modified via the local control panel on the front of the device itself.
The Jog dial that is a part of the local control panel can be used for navigation by turning it clockwise or counter-clockwise. Pressing the jog dial enables the user to make a selection or confirm information.

Note

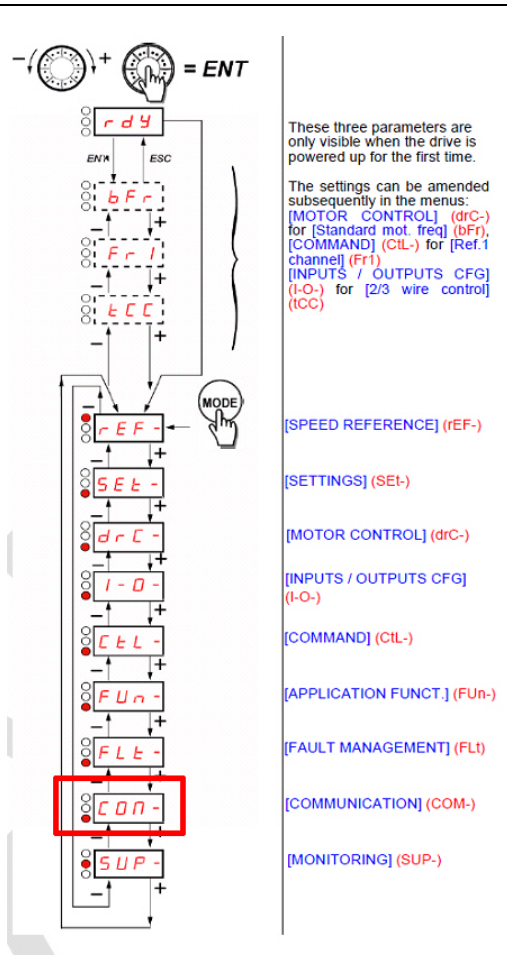
Before you start the first configuration of the drive you should re-establish the drive parameter to factory settings. If you need instructions on how to do this, please read the drive documentation.

Control panel

1	The CANopen-address and baudrate can be set using the buttons and the jog dial on the front panel of the Altivar.



CANopen settings

1	Using the buttons on the front panel, select the sub-menu **Communication (COM)**.	
2	In the **Communication (COM)** sub-menu input the CANopen address in the parameter **AdC0.** In the example application the addresses for the two drives are **1** and **2.**	
3	Also in the **Communication (COM)** sub-menu, in the parameter **BdC0,** set the Baudrate to **500.0** (kbps).	
4	For the drive to operate with the new parameters, a power cycle (on, off, on) is required.	

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

After making any configuration changes or adjustments, be sure to cycle power (remove and reapply power) on the drive.

Failure to follow these instructions can cause death, serious injury or equipment damage.

Lexium 32A

Introduction

The LXM32A parameters can be entered or modified via the local control panel on the front of the device itself.

Note

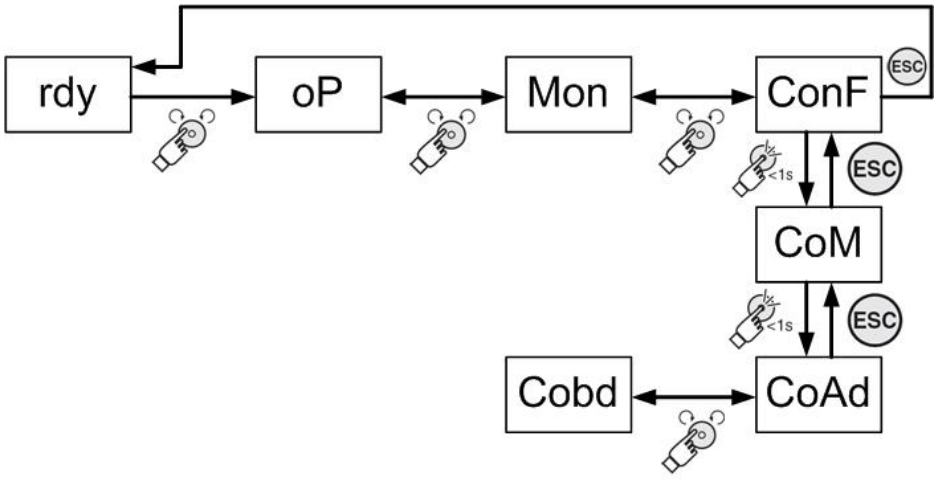
Before you start the first configuration of the drive you should re-establish the drive parameters to the factory settings. If you need instructions on how to do this, please read the drive documentation.

CANopen settings

1 If the drive is being started for the first time, the **FSu** (First Setup) is invoked. Only the CANopen address (**CoAd**) and the baudrate (**Cobd**) is initially needed.

If the drive has never been started, follow the steps below to change the address or the baudrate.

In this project the **CANopen address** for the Lexium 32 servo drives are **3 + 4**. The **Baudrate** for the drives is **500 kBaud**.



Parameter name HMI menu HMI name	Description
CANaddress ConF → CoN- ConF → FSu- CoAd	CANopen address (node number) Changed settings become active the next time the product is switched on.
CANbaud ConF → CoN- ConF → FSu- Cobd	CANopen baud rate **50 / 50 kBaud /** **50**: 50 kBaud **125 / 125 kBaud /** **125**: 125 kBaud **250 / 250 kBaud /** **250**: 250 kBaud **500 / 500 kBaud /** **500**: 500 kBaud **1000 / 1 MBaud /** **1000**: 1 MBaud Changed settings become active the next time the product is switched on.

2	For the drive to operate with the new parameters, a power cycle (on, off, on) is required.

⚠ WARNING

UNINTENDED EQUIPMENT OPERATION

After making any configuration changes or adjustments, be sure to cycle power (remove and reapply power) on the drive.

Failure to follow these instructions can cause death, serious injury or equipment damage.

TeSysU

Introduction

This chapter presents the TeSysU motor components used in this system. They can be adapted according to the application (motor output, reversing or non-reversing drive).

Basically, the TeSysU motor control unit comprises of a:

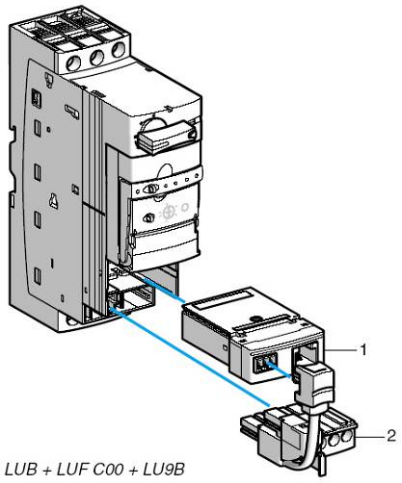
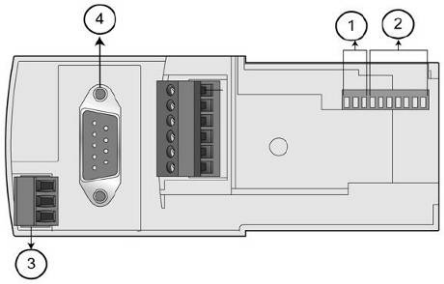
- Power base
- Control unit
- Communication module
- Coil wiring kit
- Optional: reversing block, I_s limiter/isolation block and other modules

The following points should be taken into account when selecting components:

A 24 Vdc LU2B xx BL control unit must be used. Make sure it has the BL extension.

There are different versions of the coil wiring kit, which depend on the power base. LU9B N11C should be used if the power base has one direction of rotation (LU2Bxx) and LU9M RL should be used if the power base has two directions of rotation (LU2Bxx).

TeSysU

1	**TeSysU** **Power base** LU2B12BL **Control unit** LUCA05BL **Communication module for CANopen** LULC08 (1) **Coil wiring kit** LU9MRL (2)	 *LUB + LUF C00 + LU9B*
2	**TeSysU CANopen communication module** **LULC08** The communication module is connected to the CANopen bus using cable. **TSXCANCADD1**	 **1** Baud rate **2** Address **3** Power base connector **4** CAN bus connector

<table>
<tr>
<td>3</td>
<td>TeSysU CANopen

communication module

LULC08

The baud rate is set to 500 kbps.</td>
<td>
<table>
<tr><th>SW10</th><th>SW9</th><th>SW8</th><th>Baud Rate</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>10 kbps</td></tr>
<tr><td>0</td><td>0</td><td>1</td><td>20 kbps</td></tr>
<tr><td>0</td><td>1</td><td>0</td><td>50 kbps</td></tr>
<tr><td>0</td><td>1</td><td>1</td><td>125 kbps</td></tr>
<tr><td>1</td><td>0</td><td>0</td><td>250 kbps (default)</td></tr>
<tr><td>1</td><td>0</td><td>1</td><td>500 kbps</td></tr>
<tr><td>1</td><td>1</td><td>0</td><td>800 kbps</td></tr>
<tr><td>1</td><td>1</td><td>1</td><td>1,000 kbps</td></tr>
</table>
</td>
</tr>
<tr>
<td>4</td>
<td colspan="2">The following address is used: CANopen Node ID 5
<table>
<tr><th>SW7</th><th>SW6</th><th>SW5</th><th>SW4</th><th>SW3</th><th>SW2</th><th>SW1</th><th>Address</th></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>Not valid</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1 (default)</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>2</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>1</td><td>3</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>0</td><td>4</td></tr>
<tr><td>0</td><td>0</td><td>0</td><td>0</td><td>1</td><td>0</td><td>1</td><td>5</td></tr>
</table>
</td>
</tr>
<tr>
<td>5</td>
<td colspan="2">Note: TeSysU needs 24 Vdc on CANopen cable to operate. See the chapter:

Communication: CANopen TAP: TSXCANTDM4 wiring.</td>
</tr>
</table>

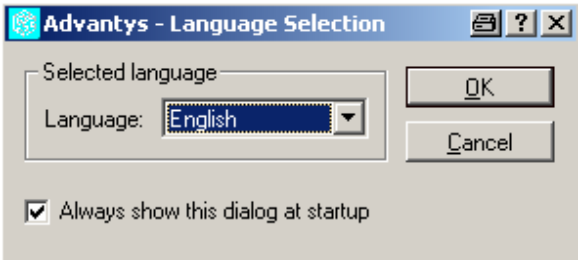
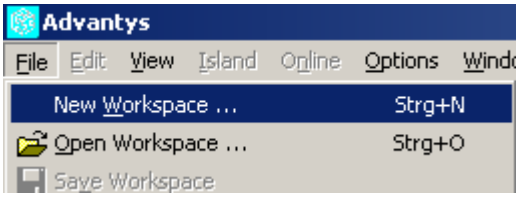
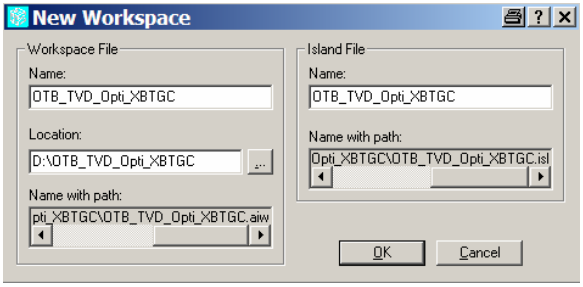
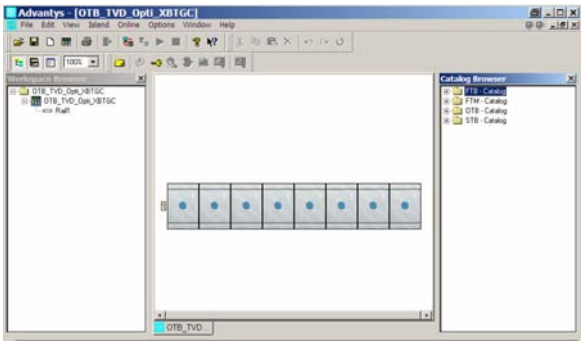
Advantys OTB

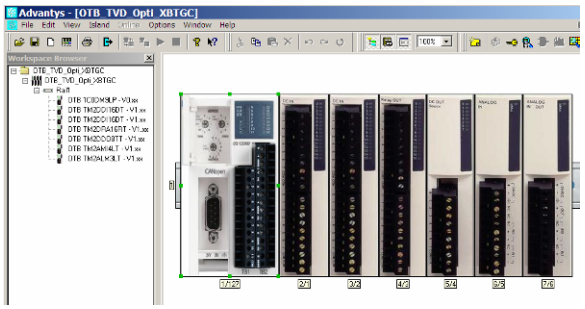
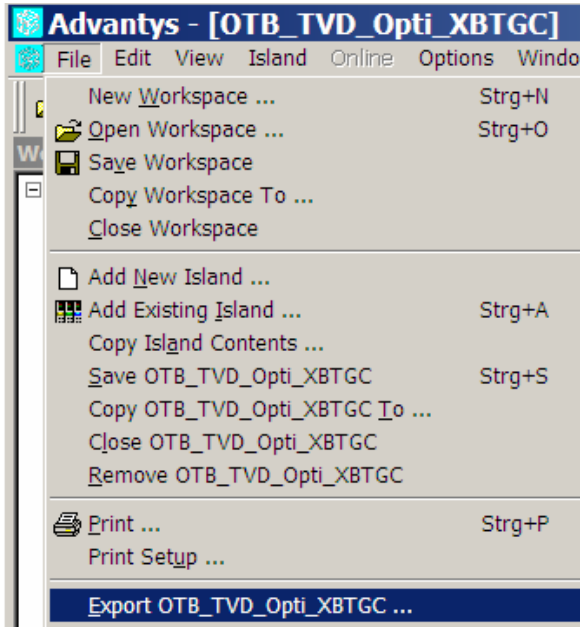
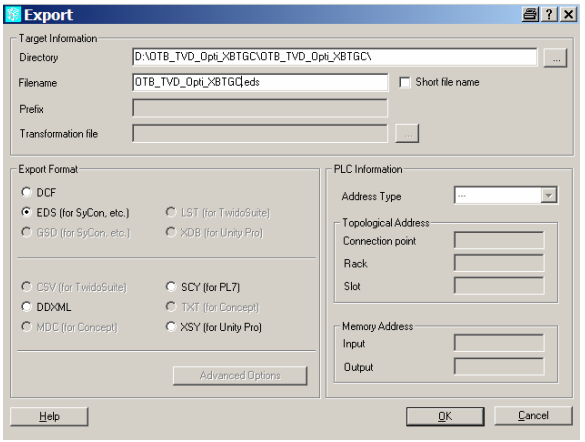
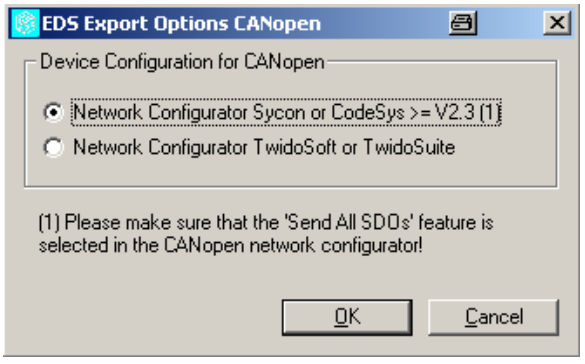
General

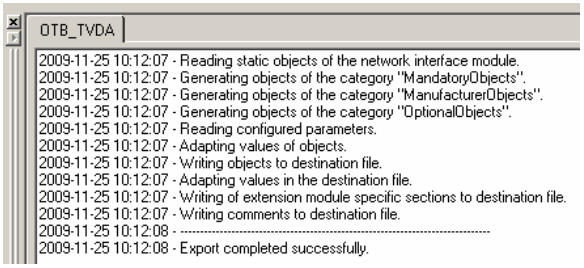
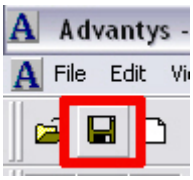
The Advantys OTB EDS (electronic data sheet) file is generated by using the Advantys Configuration Software. This section describes how to generate an EDS file, that can be imported into SoMachine Device Repository (see chapter Controller).

Note:
If you are using only the basic OTB module; the OTB1CODM9LP device can be used that is already installed in SoMachine Device Repository.

Advantys OTB Configuration

1	On start-up of Advantys Software select your **Language** and click on **OK.**	
2	Select: **File → New Workspace…**	
3	Type in the **Workspace File Name** and the **Island File Name.** Click on **OK.**	
4	The empty workspace opens. On the right side of the workspace is the **Catalog browser** here you could select the devices you need for your island. Example: **1x OTB1CODM9LP** **2x TWDDDI16DT** **1x TWDDRA16RT** **1x TWDDDO8TT** **1x TWDAMI4LT** **1x TWDAML3LT**	

5	The image on the right shows the configured rack.	
6	To generate the **EDS File** select **File → Export OTB_TVD_Opti_XBTGC**	
7	Enter the **Filename** and select **EDS** as **Export Format**. Continue the export with **OK.**	
8	Select **Network Configuration or SyCon or CoDeSys** and click **OK.**	

9	The successful export is initiated at the bottom of the main window.	
10	To save the island click on the **save** icon in the tool bar.	
11	**Note:** Refer to Communication chapter how to set OTB CANopen Baudrate and Bus address.	

Appendix

Detailed Component List

Sarel cabinet

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
1.1	1	Cabinet 1400 x 800 x 400 mm (H x W x D)	NSYSM14840P	
1.2	1	Cabinet light	NSYLAM75	
1.3	1	Cabinet fan 230 Vac	NSYCVF165M230PF	
1.4	1	Outlet filter for cabinet	NSYCAG223LPF	
1.5	1	Thermostat 1 NO 0 - 60 °C	NSYCCOTHO	
1.6	1	Pocket for Drawing	NSYDPA4	

Main switch

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
2.1	1	Main switch 3pin 36 kA	LV429003	
2.2	1	Contact block TM32D	LV429035	
2.3	1	Terminal cover	LV420321	
2.4	1	Rotary drive with door interface	LV429340	

Power supply

Optional

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
3.1	1	Phaseo Power supply 230 Vac / 24 Vdc; 3 A	ABL8RPS24030	
3.2	1	Disconnect terminal	5711016550	
3.3	1	Phaseo Power supply 230 Vac / 24 Vdc; 3.5 A	ABL4RSM24035	

HMI controller

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
4.1	1	Magelis XBTGC2230T HMI controller	XBTGC2230T	V6.0.0
4.2	1	CANopen Master XBTZGCCAN	XBTZGCCAN	V1.0

Drives

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
5.1	2	Altivar 312 variable speed drive 0.37 kW	ATV312H037N4	V5.1IE 50
5.2	2	Lexium 32A servo drive continuous output current: 6 A RMS at 6000 RPM	LXM32AD18M2	V01.06.06
5.3	2	Servo motor without brake	BMH0702P02A2A	
5.4	1	TeSysU Base unit for two directions	LU2B12BL	
5.5	1	Coil connection kit	LU9MRL	
5.6	1	TeSysU standard control unit	LUCA05BL	
5.7	1	TeSysU CANopen communication module	LULC08	
5.8	2	Magnetic circuit breaker 2.5 A	GV2L07	
5.9	2	Magnetic circuit breaker 6.3 A	GV2L10	
5.10	4	Auxiliary contacts for circuit breaker 1 NO, 1 NC	GVAE11	
5.11	5	Contactor	LC1D18BD	
5.12	2	Power cable for Lexium 32A: 3 m	VW3M5101R30	
5.13	2	Encoder cable for Lexium 32A: 3 m	VW3M8101R30	

I/O- Island

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
6.1	1	Advantys OTB CANopen	OTB1C0DM9LP	V2.20
6.2	1	Advantys OTB analog input	TM2AMI4LT	
6.3	1	Advantys OTB analog in-/output	TM2AMM3LT	
6.4	2	Advantys OTB digital input	TM2DDI16DT	
6.5	1	Advantys OTB digital output	TM2DDO8TT	
6.6	1	Advantys OTB digital relay output	TM2DRA16RT	

E-Stop

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
7.1	2	Preventa safety module	XPSAC5121	
7.2	1	E-Stop pushbutton for cabinet	XB5AS844	
7.3	1	E-Stop pushbutton for field	XALK178G	
7.4	2	Auxiliary contacts for E-Stop	ZB5AZ141	
7.5	2	Contactors 7.5 kW	LC1D18BD	
7.6	1	Door guard switch	XCSA502	
7.7	1	Actuator for door guard switch	XCSZ02	
7.8	2	Auxiliary contactor	CAD50BD	

Pushbuttons

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
8.1	2	Box for 1 pushbutton	XALD01	
8.2	1	Signal lamp LED white	XB5AVB1	
8.3	4	Pushbutton with LED blue	XB5AW36B5	
8.4	1	Signal lamp LED orange	XVBL1B5	

CANopen

Hardware-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
9.1	1	CANopen taps with 4 x SubD9	TSXCANTDM4	
9.2	1	CANopen cord set SubD9 Sub D9 1 m	TSXCANCADD1	
9.3	2	CANopen cord set SubD9 RJ45 1 m	TCSCCN4F3M1T	
9.4	1	CANopen plug 90 degree	TSXCANKCDF90T	
9.5	2	ATV312 CANopen option card	VW3A31208	
9.6	2	CANopen cable RJ45 0,3m	VW3CANCARR03	

Software

Software-Components				
Pos.	**Qty.**	**Description**	**Part Number**	**Rev./ Vers.**
10.1	1	SoMachine (includes Vijeo Designer) on DVD	MSDCHNSFNV30	V3.0
10.2	1	Single user license for SoMachine	MSDCHNL●UA	
10.3	1	Advantys Configuration Software	STBSPU1000	V5.0.0.9
10.4	1	Programming cable	XBTZG935	

Component Protection Classes

Positioning Protection Class

Component	In Field, On Site			Cabinet		
				Front		Inside
	IP54	IP65	IP67	IP55	IP65	IP20
Compact NSX main switch						**X**
Emergency Stop switch housing XALK		**X**				
Preventa module XPSAC						**X**
Harmony single/double switch housing		**X**				
Harmony control switch					**X**	
Harmony indicator pushbuttons		**X**				
Lexium 32A servo drive						**X**
BMH servo motor		**X** shaft end IP40				
Altivar 312 variable speed drive						**X**
Magelis XBTGC HMI controller					**X**	**X**
Contactor						**X**
Phaseo power supply						**X**
Advantys OTB I/O island						**X**

Environmental Characteristics

NOTE: The equipment represented in the architecture(s) of this document has been rigorously tested to meet the individually specified environmental characteristics for operation and storage, and that information is available in the product catalogs. If your application requirements are extreme or otherwise do not appear to correspond to the catalog information, your local Schneider Electric Support will be eager to assist you in determining what is appropriate for your particular application needs.

Component Features

Components

Compact NSX main switch

Compact NSX disconnector from 12 to 175 A are suitable for on-load making and breaking of resistive or mixed resistive and inductive circuits where frequent operation is required. They can also be used for direct switching of motors in utilization categories AC-3 and DC-3 specific to motors.

- 3-pole rotary switch disconnector, 12 to 175 A
- Pad lockable operating handle (padlocks not supplied)
- Degree of protection IP65

Power supply Phaseo ABL8RPS24030

- Single or 2-phase connection
- 100 Vac … 120 Vac and 200 Vac …500 Vac input
- 24 Vdc output
- 3 A output
- Diagnostic relay
- Protected against overload and short circuits

Preventa safety module: XPSAC5121

Main technical characteristics:

For monitoring	Emergency Stop
Max. Category accord. EN954-1	3
No. of safety circuits	3 N/O
No. of additional circuits	1 Solid-State
Indicators	2 LED
Power supply AC/DC	24 V
Response time on input opening	< 100 ms
AC-15 breaking capacity	C300
DC-13 breaking capacity	24 Vdc / 2 A - L/R 50ms
Minimum voltage and current	17 V / 10 mA
Dimensions (mm)	114 x 22.5 x 99
Connection	Captive screw-clamp terminals
Degree of protection	IP20 (terminals) IP40 (casing)

Safety modules XPS AC are used for monitoring Emergency Stop circuits conforming to standards EN ISO 13850 and EN 60204-1 and also meet the safety requirements for the electrical monitoring of switches in protection devices conforming to standard EN 1088 ; ISO 14119. They provide protection for both the machine operator and the machine by immediately stopping the dangerous movement on receipt of a stop instruction from the operator, or on detection of a fault in the safety circuit itself.

Magelis XBTGC2230 HMI controller

The Magelis XBTGC HMI controller is powered with 24 Vdc.

The Magelis XBTGC HMI controller offers:
Expansion interface to attach CANopen Master module

- 16 x 24 Vdc inputs including 4 fast inputs, dedicated to special functions such as HSC high-speed counting
- 16 x 24 Vdc solid state outputs including 4 fast outputs, dedicated to special functions such as counting, PWM and PTO
- Expand the I/O count by adding up to 3 expansion modules. The following modules are available:
    - Discrete TM2DDI/DDO/DMM/DRA
    - Analog TM2AMI/ALM/ARI/AMO/AVO/AMM

*Depends on the XBTGC model, the combination of the expansion modules and the use of the hook XBT ZGCHOK.

The XBTGC HMI Display has the following features:

- Brightness and Contrast adjustment
- 16 MB Flash for Application (HMI + Control)
- One USB port host, Ethernet and one serial port multi-protocol Sub-D9 RS232/ RS422-485 on specific models
- Temperature range: 0..+ 50 °C

Altivar 312 variable speed drive

The Altivar 312 is a variable speed drive for 3-phase squirrel cage asynchronous motors. The Altivar 312 is robust, compact, easy to use and conforms to EN 50190, IEC/EN 61800-2, IEC/EN 61800-3 standards UL/CSA certification and to CE marking.

Altivar 312 drives communicate on Modbus and CANopen industrial buses. These two protocols are integrated as standard.

Multiple units can be mounted side by side to save space.

Drives are available for motor ratings between 0.18 kW and 15 kW, with four types of power supply:

- 200 Vac to 240 Vac 1-phase, 0.18 kW to 2.2 kW
- 200 Vac to 240 Vac 3-phase, 0.18 kW to 15 kW
- 380 Vac to 500 Vac 3-phase, 0.37 kW to 15 kW
- 525 Vac to 600 Vac 3-phase, 0.75 kW to 15 kW

Lexium 32 servo drive

- Voltage range:
  - 1-phase 100 – 120 Vac or 200 – 240 Vac
  - 1-phase 200 – 240 Vac or 380 – 480 Vac
- Power: 0.4 to 6 kW
- Rated torque: 0.5 to 36 Nm
- Rated speed: 1500 to 8000 RPM
- The compact design allows for space-saving installation of the drive in control cabinets or machines.
- Features the "Power Removal" (Safe Stop) functional safety function, which prevents the motor from being started accidentally. Category 3 with machine standard EN 954-1
- Lexium 32 servo amplifiers are fitted with a brake resistor as standard (an external brake resistor is optional)
- Quick control loop scan time: 62.5 µs for current control loop, 250 µs for speed control loop and 250 µs for position control loop
- Operating modes: Point-to-point positioning (relative and absolute), electronic gears, speed profile, speed control and manual operation for straightforward setup.
- Control interfaces:
  - CANopen, Modbus or Profibus DP
  - Analog reference inputs with ± 10 Vdc
  - Logic inputs and outputs

TeSysU Motor Starter

One power base

Control unit 0.15 to 32 A
- Only 6 setting ranges up to 32 A
- Only 4 voltage ranges up to 240 Vac / dc
- 3 versions: Standard, Extended, Multifunctional

Overall width 45 mm

Complete reversing contactor combination 0.15 to 32 A

Auxiliary switches and function modules
- Integrated: Motor circuit breaker auxiliary contact 1 NC, with connectors
- Integrated: Contactor auxiliary contacts 1 NO + 1 NC, freely available
- Option: Auxiliary switch module with 2 contactor state contacts
- Option: “Error” and “Selector switch position” signal contact
- Alarm – thermal overload function module
- Motor load display function module (0 to 10 V, 4 to 20 mA)
- Differentiated error display function module (under development)

Communication modules
- Parallel wiring; with plug-in connection cables up to eight motor controls can be supplied on one distribution module
- Modbus RTU protocol
- AS-Interface
- CANopen

Advantys OTB distributed I/O OTB1CODM9LP

Interface module for OTB I/O-Island with the following technical specifications:

- Bus parameterization via bus backplane module on PLC
- Integrated macros for rapid start-up
- 16-channel input
- Removable screw terminal block

Advantages when integrating or replacing module

- Slim line design
- Plug-in contacts
- Controller sends configuration every time the power supply is connected

- CANopen connector Sub-D9
- Up to 7 expansion modules can be connected
- Very compact
- 12 Digital Inputs
- 6 Relay Outputs
- 2 Transistor Outputs (Source)
- 2 Remote Fast Counters
- 2 Remote Very Fast Counters
- 2 Impulsion Generators

Advantys OTB 16 digital input TM2DDI16DT

- expansion I/O modules

- 16 x 24 Vdc Inputs
- 20.4...28.8 Vdc
- 7 mA per point

Advantsy OTB digital input TM2DRA16RT

- expansion I/O modules

- digital relay outputs
- Relay with 1 N/O contact
- 240 Vac, 30 Vdc
- 8 A max.

Advantsy OTB digital input TM2DO08TT

- expansion I/O modules

- 8 digital outputs
- 24 Vdc transistor outputs
- Transistor
- 20.4...28.8 Vdc
- 0.3 A nominal

Advantys OTB analog module TM2ALM3LT

- expansion I/O modules

- 2 Pt100 / Thermocouple inputs
- 1 analog output

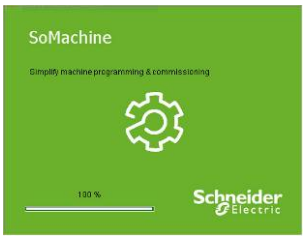
- 12 bits (4096 points)
- 0...10 Vdc
- 4...20 mA

Advantys OTB analog module TM2AMI4LT

- expansion I/O modules

- 4 analog inputs
- Voltage/current
- Temperature
- 0...10 Vdc
- 0...20 mA
- Pt100 ; Pt1000
- Ni100 ; Ni1000
- 12 bits (4096 points)

SoMachine OEM Machine Programming Software: MSDCHNSFNV30



SoMachine is the OEM solution software for developing, configuring and commissioning the entire machine in a single software environment, including logic, motion control, HMI and related network automation functions.

SoMachine allows you to program and commission all the elements in Schneider Electric's Flexible and Scalable Control platform, the comprehensive solution-oriented offer for OEMs, which helps you achieve the most optimized control solution for each machine's requirements.

Flexible and Scalable Control platforms include:

Controllers:

HMI controllers:
- Magelis XBTGC HMI controller
- Magelis XBTGT HMI controller
- Magelis XBTGK HMI controller

Logic controllers:
- Modicon M238 Logic controller
- Modicon M258 Logic controller

Motion controller
- Modicon LMC058 Motion controller

Drive controller:
- Altivar ATV-IMC Drive controller

HMI:

HMI Magelis graphic panels:
- XBTGT
- XBTGK
- XBTGH
- HMISTU / HMISTO

SoMachine is a professional, efficient, and open software solution integrating Vijeo-Designer.
It integrates also the configuring and commissioning tool for motion control devices.

It features all IEC 61131-3 languages, integrated field bus configuration, expert diagnostics and debugging, as well as outstanding capabilities for maintenance and visualization.

SoMachine provides you:
- One software package
- One project file
- One cable connection
- One download operation

Advantys Configuration Software STBSPU1000

Software to configure the Advantys OTB, (STB, FTB and FTM).

- Parameterize all the I/O modules of the Advantys OTB platform (digital, analog and intelligent modules) with standard functions.
- Generating of export EDS files for SoMachine

Contact

Homepage	http://www.schneider-electric.com
As standards, specifications and designs change from time to time, please ask for confirmation of the information given in this publication.	